CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

VANADIUM-ALLOYS STEEL COMPANY

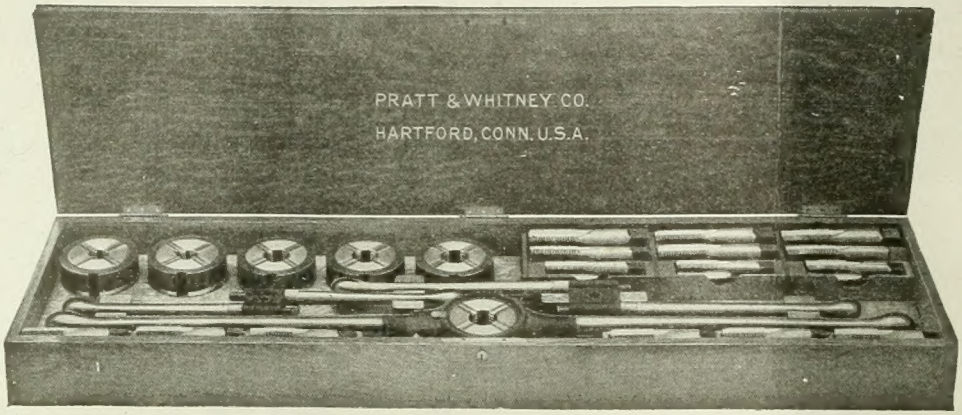
Gen'l Sales Offices: Pittsburgh, Pa. Works: Latrobe, Pa.

BRANCH OFFICES:

TORONTO
MONTREAL
NEW YORK
BUFFALO
BOSTON
CLEVELAND
CHICAGO
PHILADELPHIA
CINCINNATI
DETROIT
PITTSBURGH

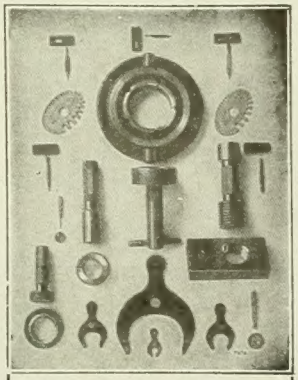
LIBRARY JUN 16 1922 UNIVERSITY OF TORONTO

SMALL TOOLS



P. & W. Die-Stock Set No. 4

These sets are furnished in various capacities for either U. S. Standard, S. A. E. Standard, Whitworth Standard or "V" Form. The Pratt & Whitney Policy of highest quality materials, together with the necessary refinement and accuracy, is maintained in all tools composing these sets.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM
MACHINE TOOLS

42-inch Vertical Boring and Turning Mill

Motor driven through speed box. Built in sizes from 42-inch to 100-inch.

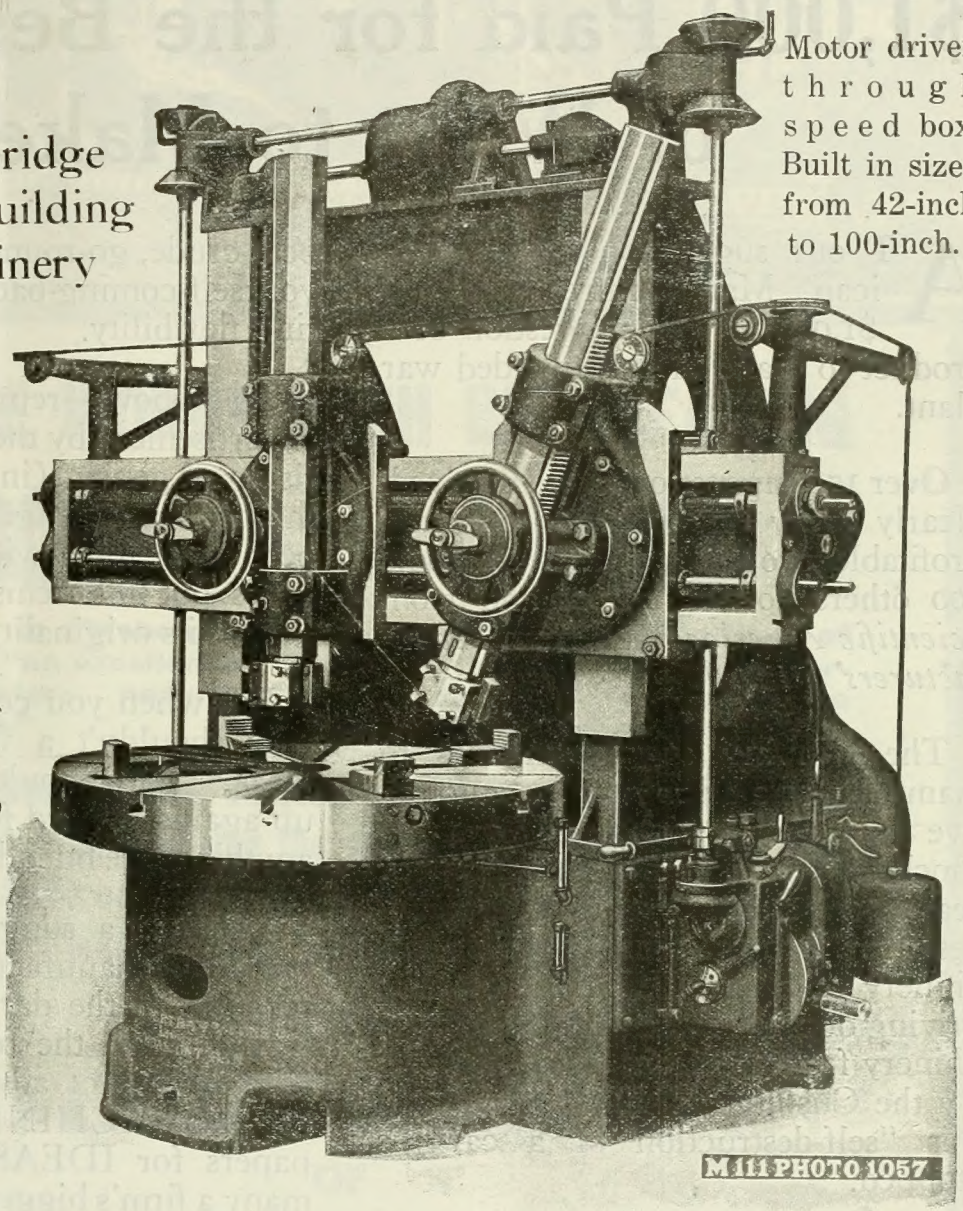
Structural Bridge Shop and Shipbuilding Plant Machinery

Locomotive and Car Shop Equipment

Repair Shop Machinery

General Machine Shop Equipment

Drop us a line for Photographs and full particulars.



M.111 PHOTO 1057

The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO FEBRUARY 20, 1919

$1,000 Paid for the Best Idea of What to Make

AT our suggestion "An American Manufacturer" offered $1,000 for the suggestion of a product to make in its expanded war plant.

Over 150 suggestions were received. Nearly every one was a promising, profitable proposition, as were some 100 others coming direct and from *Scientific American* and from *Manufacturers' Record*.

The winning suggestion was to manufacture a *drive unit* for automotive vehicles, which will cushion shocks. The irregular traction of rear wheels shoots destructive force incessantly into the whole driving machinery of a car. Likewise careless driving does the same thing to the machinery from the front end of the car. By the Cushioning Drive Principle this "self-destruction of a car" is stopped.

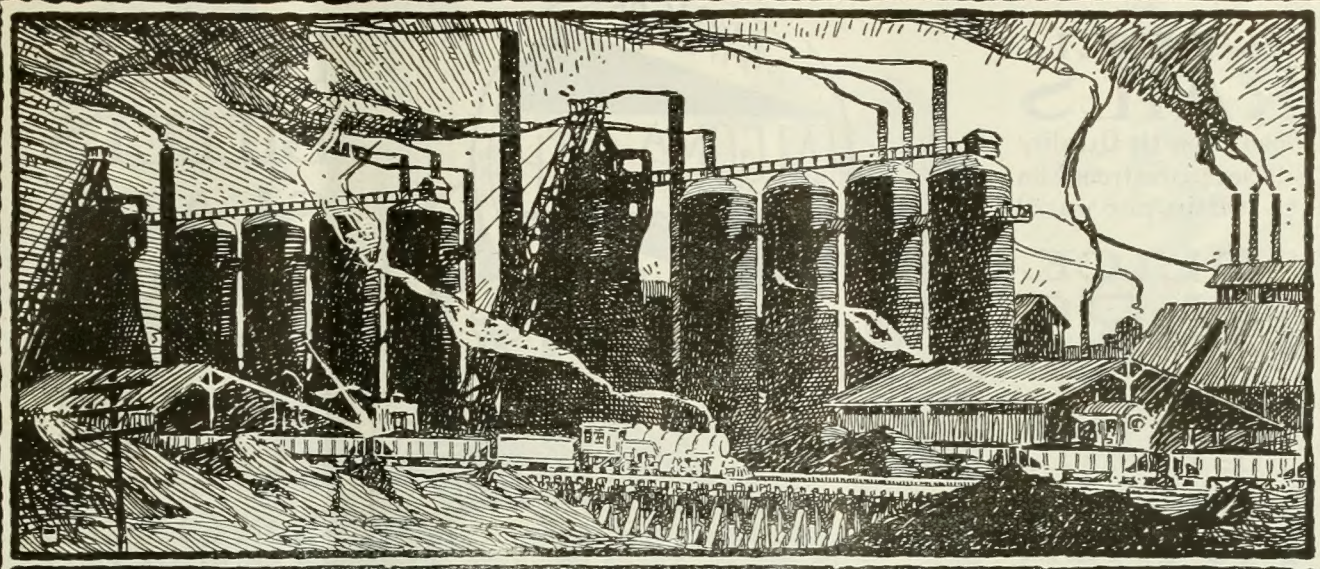
Strangely enough, perhaps, the cushioning disks employed on the drive shaft dispense with universal joints, so endlessly troublesome and expensive to car owners. These flexible disks make a metal joint seem to be a crude, go-round-the-corner-meet-yourself-coming-back means for getting flexibility.

The above—reproduced from an advertisement by the Erickson Advertising Agency (in *Printer's Ink*) is mighty interesting. Advertising has been used for a wide variety of purposes, but this seems to us rather startling in its originality.

But when you come to think of it, why shouldn't a firm advertise for ideas? Why should a manufacturer, up against it hard for a good idea, do anything else but advertise?

There is a suggestion in this for Canadian manufacturers who may be groping in the dark — feeling their way through the reconstruction tunnel. Why not advertise in CANADIAN MACHINERY and in other papers for IDEAS? An IDEA is many a firm's biggest asset.

Advertising has done far more wonderful things than uncovering workable ideas. Good practical ideas are worth a lot right now, however, and advertising is worth trying. Who'll try it?



LITTLE WORDS WITH BIG MEANING

Quality

According to "Webster," Quality is "an excellence of character; natural superiority."

Service

Webster's definition of "Service" is; "The performance of labor for the benefit of another."

We use these words advisedly—fully understanding their definitions—and realizing the obligation we place upon ourselves by their continued use in connection with our products of Iron and Steel, and our attitude to the people we serve.

THE

STEEL COMPANY

OF

CANADA

LIMITED

MONTREAL HAMILTON

Pig Iron,
Steel & Iron Bars,
Horse Shoes,
Steel and Iron Products.

Steel Billets,
Track Spikes &
Bolts, Forgings, Wire
of every description.

If any advertisement interests you, tear it out now and place with letters to be answered.

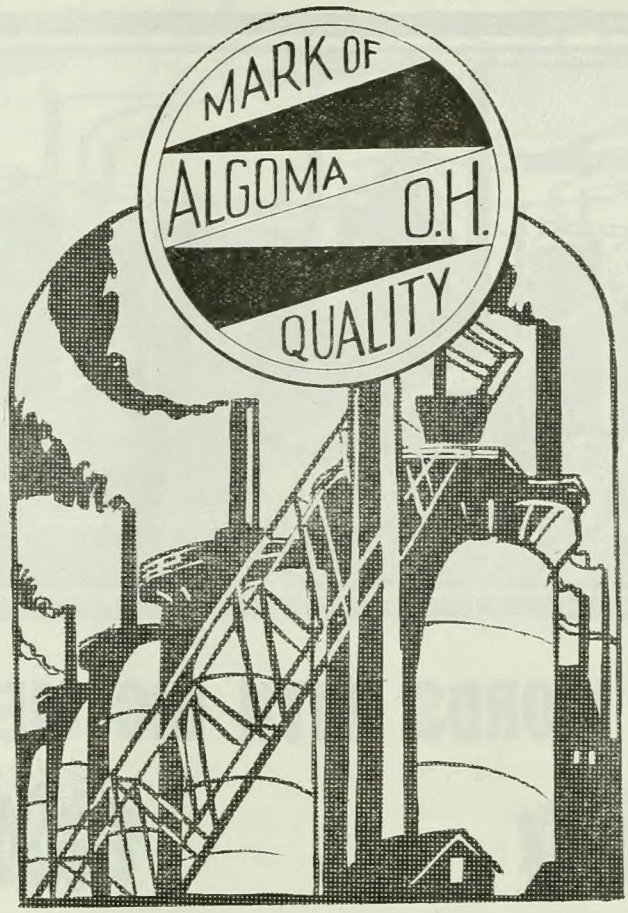
STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

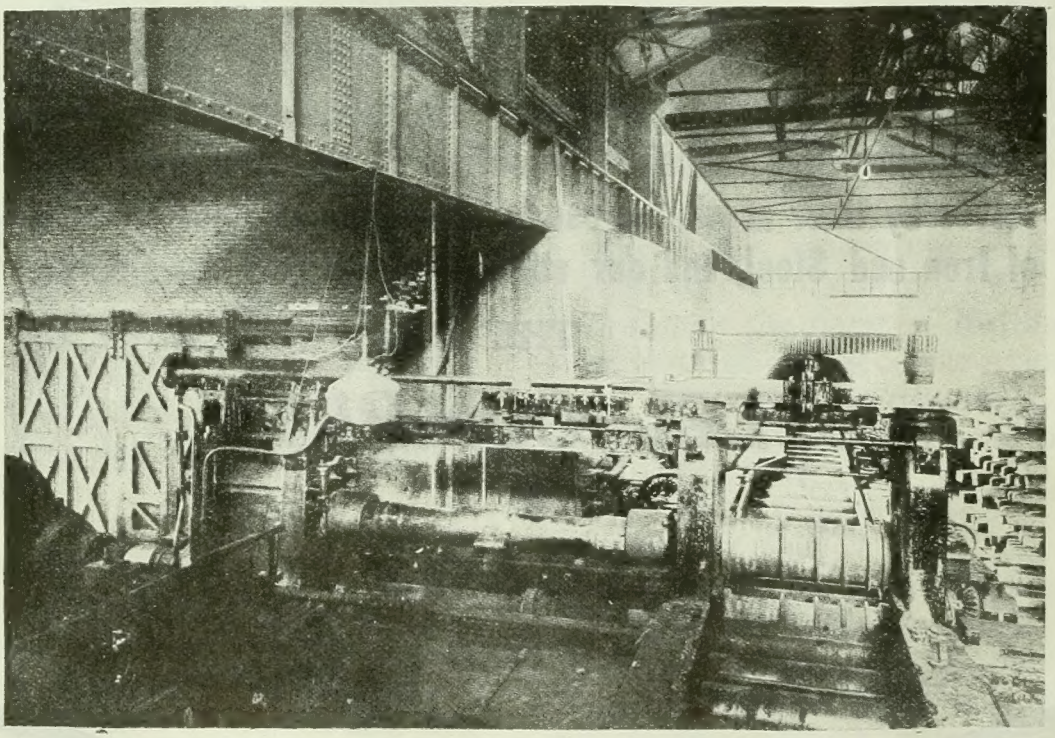
PIG IRON
BASIC, FOUNDRY-
BESSEMER

SULPHATE OF AMMONIA



BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

Sulphuric Acid. *Nitre Cake.*



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

If any advertisement interests you, tear it out now and place with letters to be answered.

Use Quality Drills!

Where there's a WILT-- There's the Way

It will pay you to investigate drills that are being used in your shop. Take your foreman into your confidence and let him make tests for you. Let him know that you are interested and desire that he should have the best tools to work with. Drills of quality are more economical because they will drill better and more holes, and last longer, thus increasing production and decreasing the drill cost.

WILT High Speed and Carbon Twist Drills are famous for their QUALITY

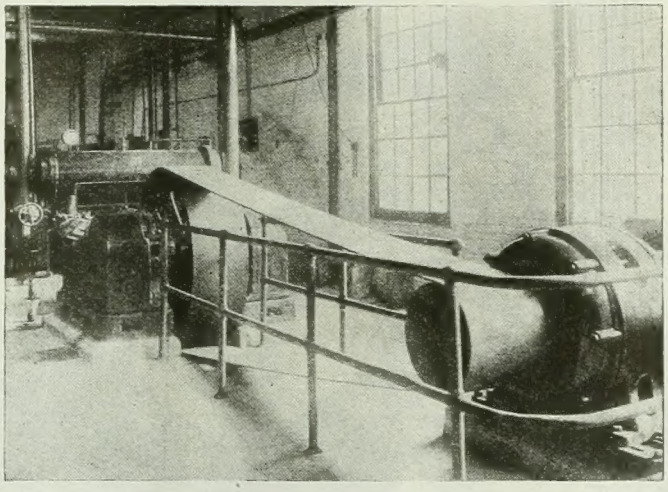
Wilt Twist Drills are produced by new and superior methods assuring accuracy, increased production and long life. Illustration shows head-on view of the drill. The dotted lines indicate three roughing cuts and the finishing cut which takes off the last fifteen-one-thousandths of an inch.

You can rely on WILT DRILLS giving you all the service that any drill can possibly give—a test will prove this.

WILT TWIST DRILL COMPANY
OF CANADA, LIMITED
Walkerville - Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. (2), England.

WILT HIGH SPEED AND CARBON TWIST DRILLS



Repeat Orders Talk---There is another of our "PLB-2" Air Compressors in this Montreal Plant

The "PLB-2" Air Compressor Bulletin is K-301-A

Canadian Ingersoll-Rand Company, Limited.

Sydney Sherbrooke Montreal Toronto Cobalt Winnipeg Nelson Vancouver

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

WOLFRA
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

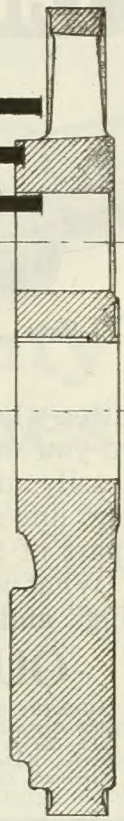
A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
Aliquippa ESTABLISHED 1900 Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

LOCOMOTIVE CASTINGS



CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

URANIUM

HIGH SPEED STEEL

Just what causes hardness is a matter of theory, but the cold fact still remains that URANIUM gives a cutting tool that hardness and toughness so essential to cutting tools.

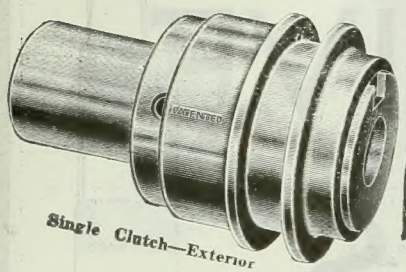
In many shops the use of URANIUM is the sole means of keeping up a large scale production.

Investigate the possibilities of URANIUM.

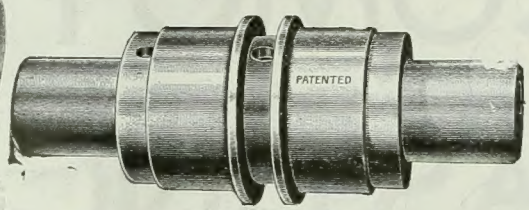
STANDARD ALLOYS COMPANY
FORBES AND MEYRAN AVES.
PITTSBURGH PENNA.

THE JOHNSON FRICTION CLUTCH

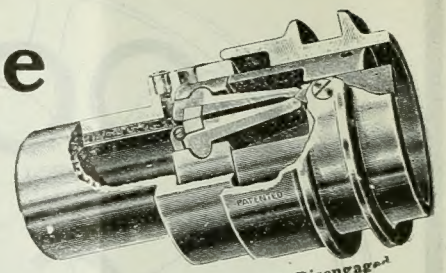
For Your Use



Single Clutch—Exterior



Double Clutch—Exterior



Showing Clutch Disengaged

No matter what your requirements may be, there is a JOHNSON FRICTION CLUTCH ready to give you unfailing service. JOHNSON FRICTION CLUTCHES are small, compact, powerful, easily adjusted with no projecting parts, links or arms to cause accidents. On the overhead shafting, line shafts or countershafts, JOHNSON FRICTION CLUTCHES work to advantage. As a part of machine tools of various kind the JOHNSON FRICTION CLUTCH is unbeatable. What are YOUR clutch requirements? Our booklet, "Clutches as Applied in Machine Building" and

OUR YELLOW DATA SHEETS ON REQUEST

AGENTS: CANADA—Williams & Wilson, 320 James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe., Chambers. 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main St., Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Forging Billets and Bars
Electric Furnace
Alloy Steels
Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
High Speed Steel

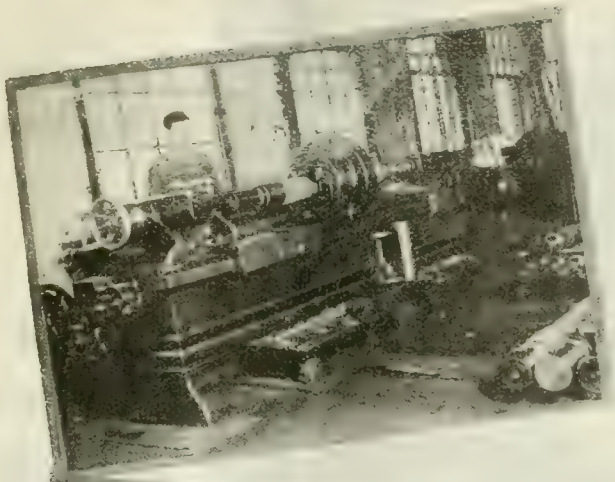
General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

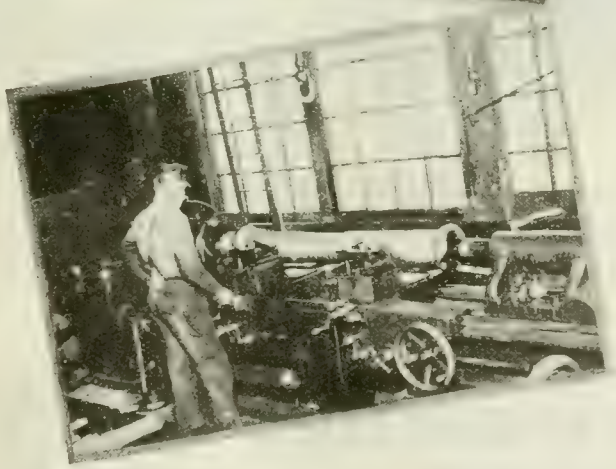
E S & M

ELECTRIC
Steel Castings
High Grade STEEL Castings
Of Every Description
Prompt Deliveries
Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

BRIDGEFORD





Heavy Duty Axle Lathes

TO the mechanical official who judges a machine strictly on its merits — "Bridgeford" means a Heavy Duty Lathe which is relied upon to maintain high production and to keep costs uniformly low.

That applies to the Bridgeford line throughout — Engine Lathes — Axle Lathes — Journal Truing Lathes — so that in practically every railroad shop of importance "Bridgefords" handle the lion's share of the difficult heavy turning.

In big plants like the Cambria Steel Company, of Johnstown, Pa., where axle production is on a basis of efficient quantity production, batteries of Bridgefords are kept busy day and night. That these machines have not cost the Cambria Company a nickel for repairs in three years of forced production, is responsible for the recent installation of another large battery of "Bridgefords."

Your demands may be exacting, but Bridgeford Lathes will meet them —your work may be difficult, but Bridgeford Lathes will handle it with ease and economy. Ask us for definite proof of the cost-cutting possibilities of these machines. We can show you a worth-while saving.

Made in sizes ranging from 24" to 72" swing.

BRIDGEFORD MACHINE TOOL WORKS

161 WINTON ROAD, ROCHESTER, N. Y., U.S.A.

Manufacturers of Heavy Duty Lathes for More Than 20 Years

If any advertisement interests you, tear it out now and place with letters to be answered.

FORD-SMITH

MILLERS

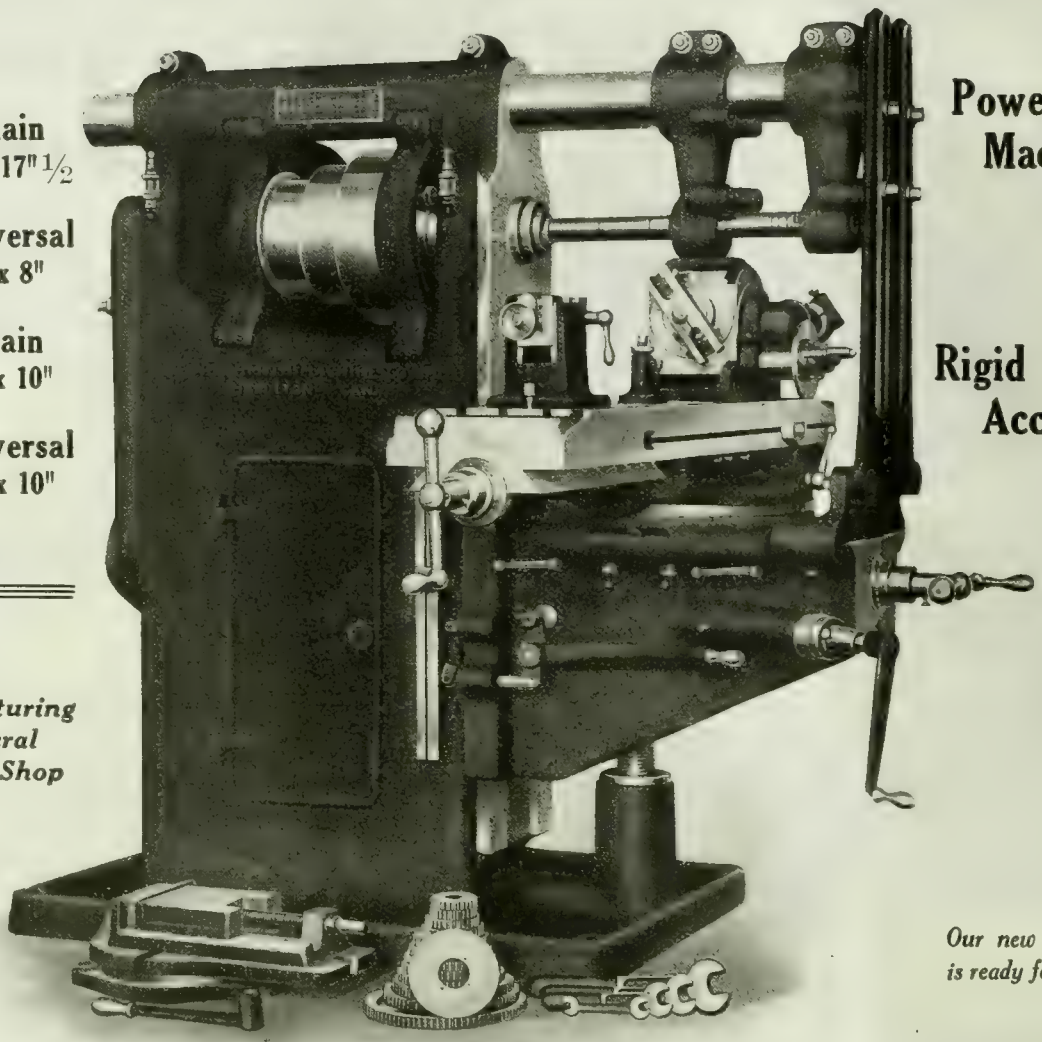
PLAIN AND UNIVERSAL

No. 2 Plain
24" x 19" x 17" 1/2

No. 2 Universal
25" x 17" x 8"

No. 3 Plain
34" x 20" x 10"

No. 3 Universal
30" x 19" x 10"



Powerful Machines

Rigid and Accurate

For Heavy Manufacturing and General Machine Shop Work.

Our new Catalogue is ready for mailing

An extract from a recent letter from one of our export agents, Alfred Herbert, Ltd., Yokohama, Japan.

You will be pleased to know that your Millers have been well received here, and we hope to dispose of quite a number more in the near future. We have placed four machines with one of the Japanese Government Arsenals, and they are so pleased with them they want us to let them have two or three more out of the next lot that is coming along.

Manufactured by

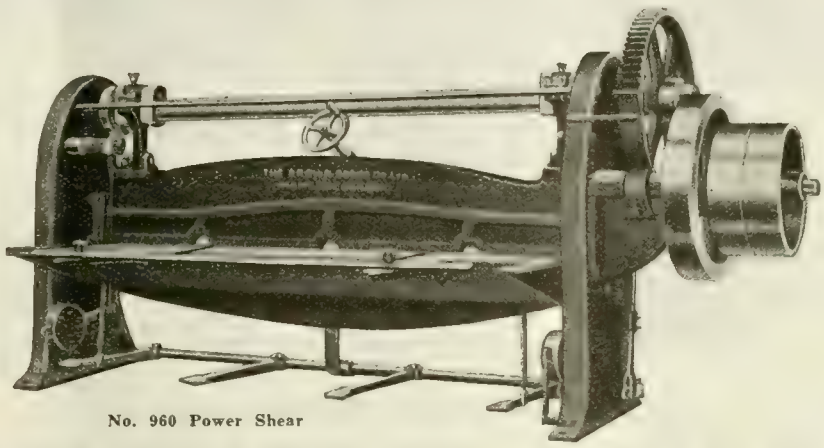
THE FORD-SMITH MACHINE CO., LTD.

HAMILTON, ONT., CANADA

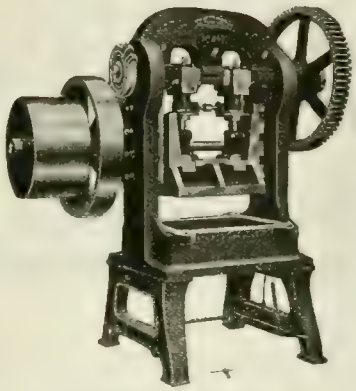
Agent for Great Britain : W. E. Storey, 3 Arundel St., London, England.

Agent for United States and Foreign Countries : Alf. Herbert Ltd. 54 Dey St., New York.

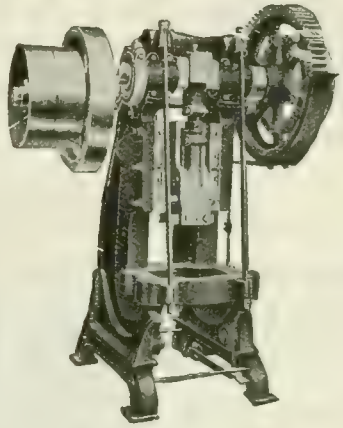
Stood The Test



No. 960 Power Shear



No. 20½ Power Press



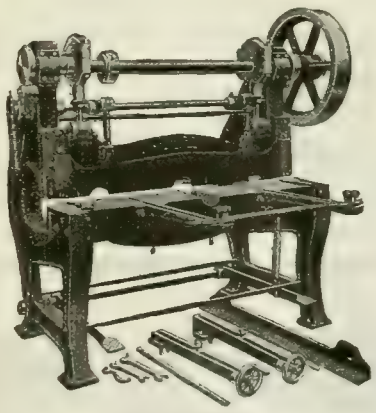
No. 215 Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

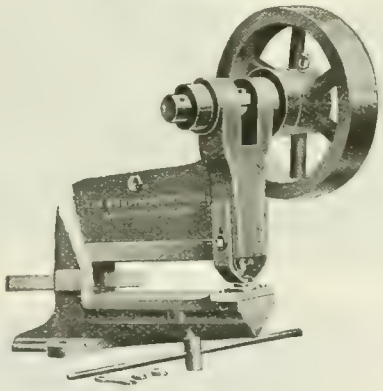
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.
1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co
Port Colborne, Ontario, Canada

M.A. HANNA & CO.
Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S

Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

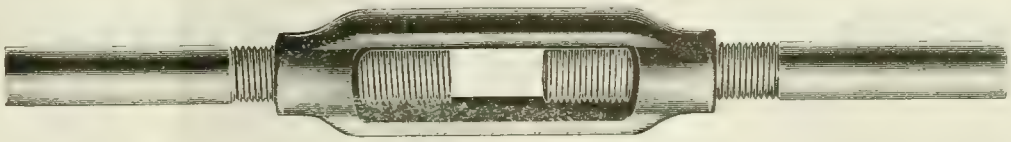
FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO
J. A. SHERWOOD
Canadian Manager

CANADA
FOUNDRIES & FORGINGS
LIMITED

DROP FORGED STEEL



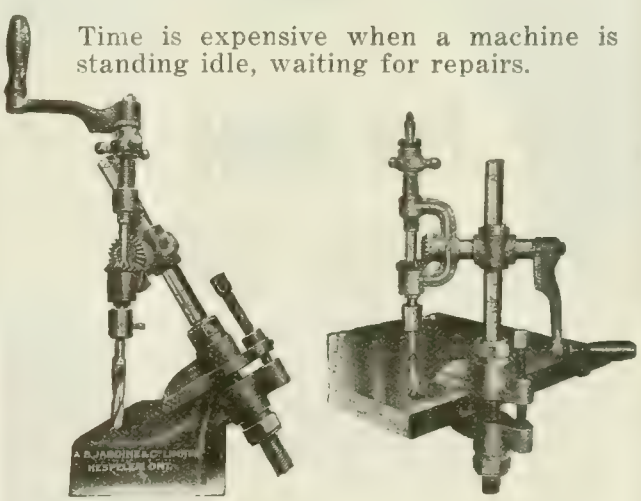
TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
Welland

Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway
RALPH B. NORTON, AGENT
Montreal, Canada

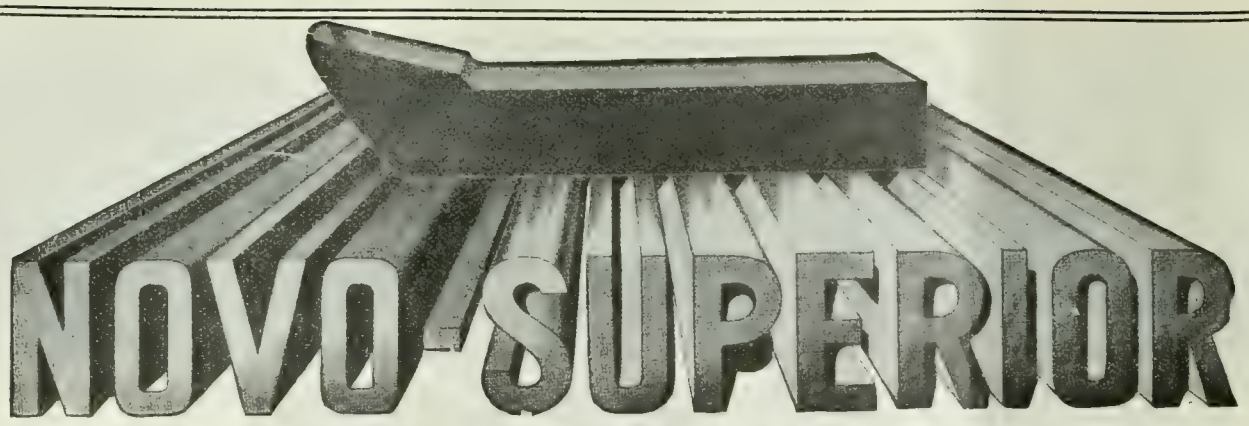
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net.
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws – for wood and for hot or cold metal cutting
Machine Knives – for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

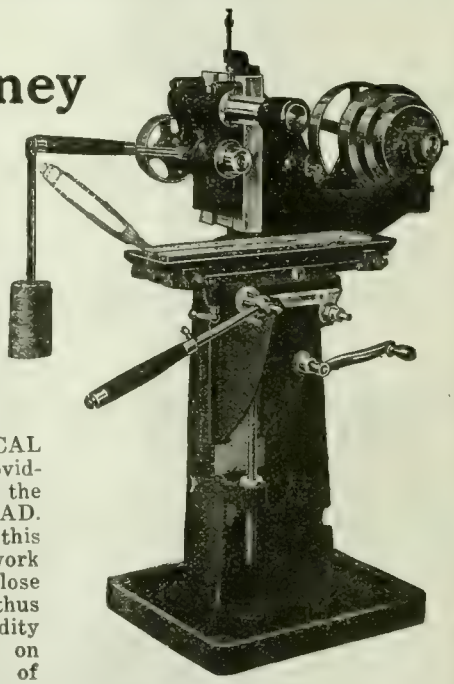
TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

THOUSANDS IN USE

The Whitney

Hand Milling Machine



The VERTICAL FEED is provided for by the SLIDING HEAD. On account of this feature the work can be held close to the table, thus giving a rigidity not possible on other types of Hand Millers.

Send for Catalogue A.

The Whitney Mfg. Co.

Hartford Conn. U.S.A.

Chains – Keys Hand Milling Machines

STELLITE

"Not Steel but its Master"

Anecdotal

The superintendent in one of the largest machine shops on the continent recently tried an experiment with the idea of substituting High Speed Steel for STELLITE under the delusion that High Speed Steel would do as well and be cheaper.

He gave four tools tipped with High Speed Steel and instructions to do his best, to one of the operators. The production report was watched carefully for a week and it was noted that the man with the High Speed Steel tools was daily in advance of his fellows.

The superintendent then paid a visit to the operator to compliment him on his work when the following conversation ensued:—

Q—"Are you the chap I gave the High Speed Steel tools to ?"

A.—"Yes, sir."

Q.—"How do they work?"

A—"Fine, there they are on the bed of the lathe."

Q.—"What have you got in the lathe?"

A.—"STELLITE—how do you think I got my production?"

MORAL—If the operator wants STELLITE, get it for him—he knows, and the results show in added production.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

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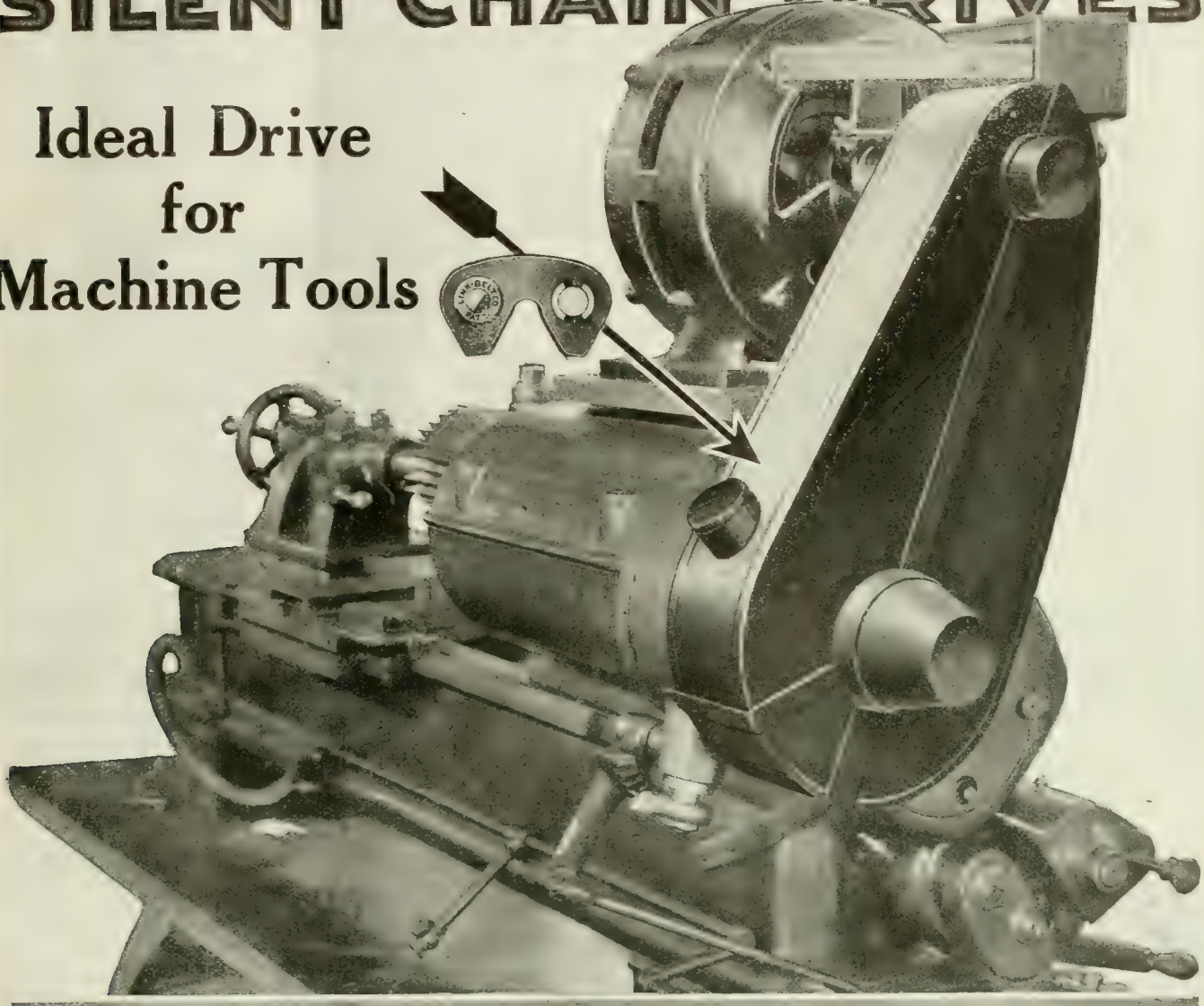
SILENT CHAIN DRIVES

Ideal Drive for Machine Tools



LINK-BELT Silent Chain Drives, for direct motor drives on machine tools, form a positive, flexible driving medium operating at 98.2% efficiency, no matter how short the centers.

Belts slip, waste power and cause tools to "chatter." Gears wear, become noisy and afford no "cushion" between motor and machine.

Link-Belt Silent Chain Drives absorb the shock when heavy loads are applied, thus lengthening the life of the machine. They never slip, never waste power, and improve the product. They are "Flexible as a Belt, Positive as a Gear, More Efficient than Either."

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An Innovation In the Field of Wall Radial Drills

You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

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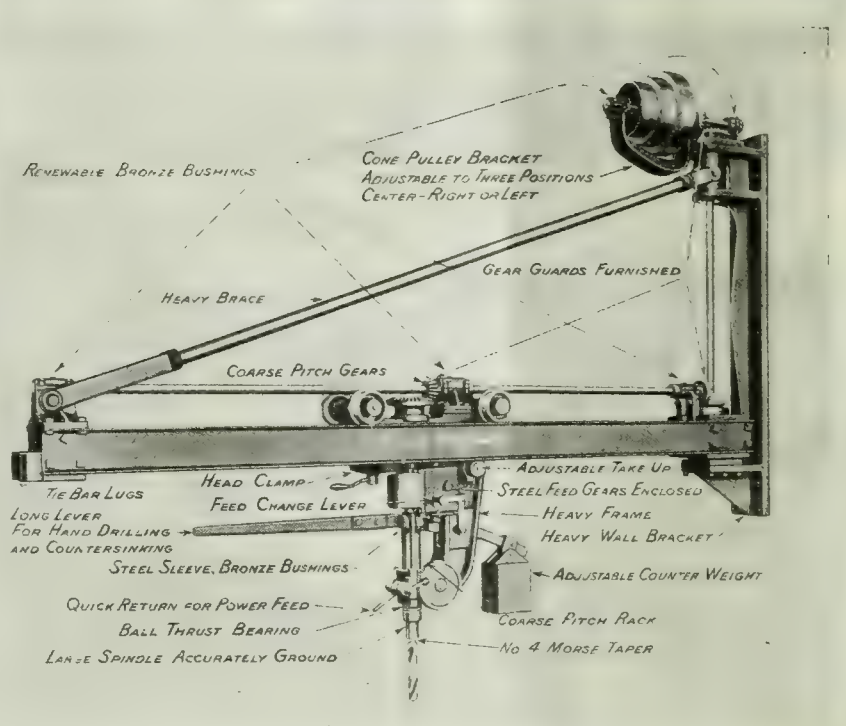

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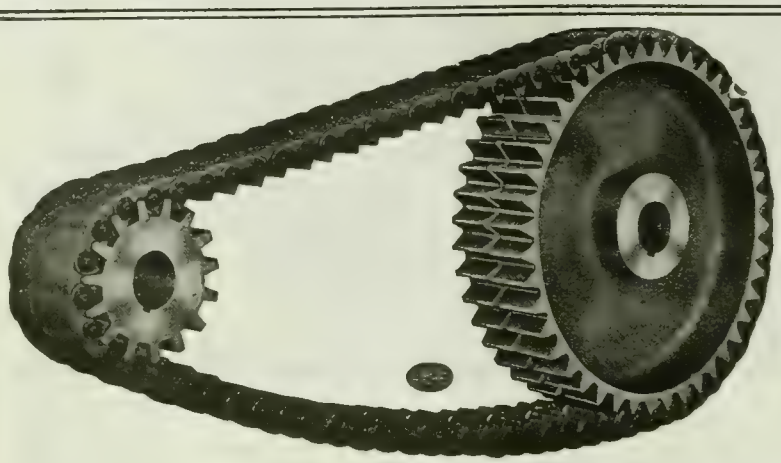

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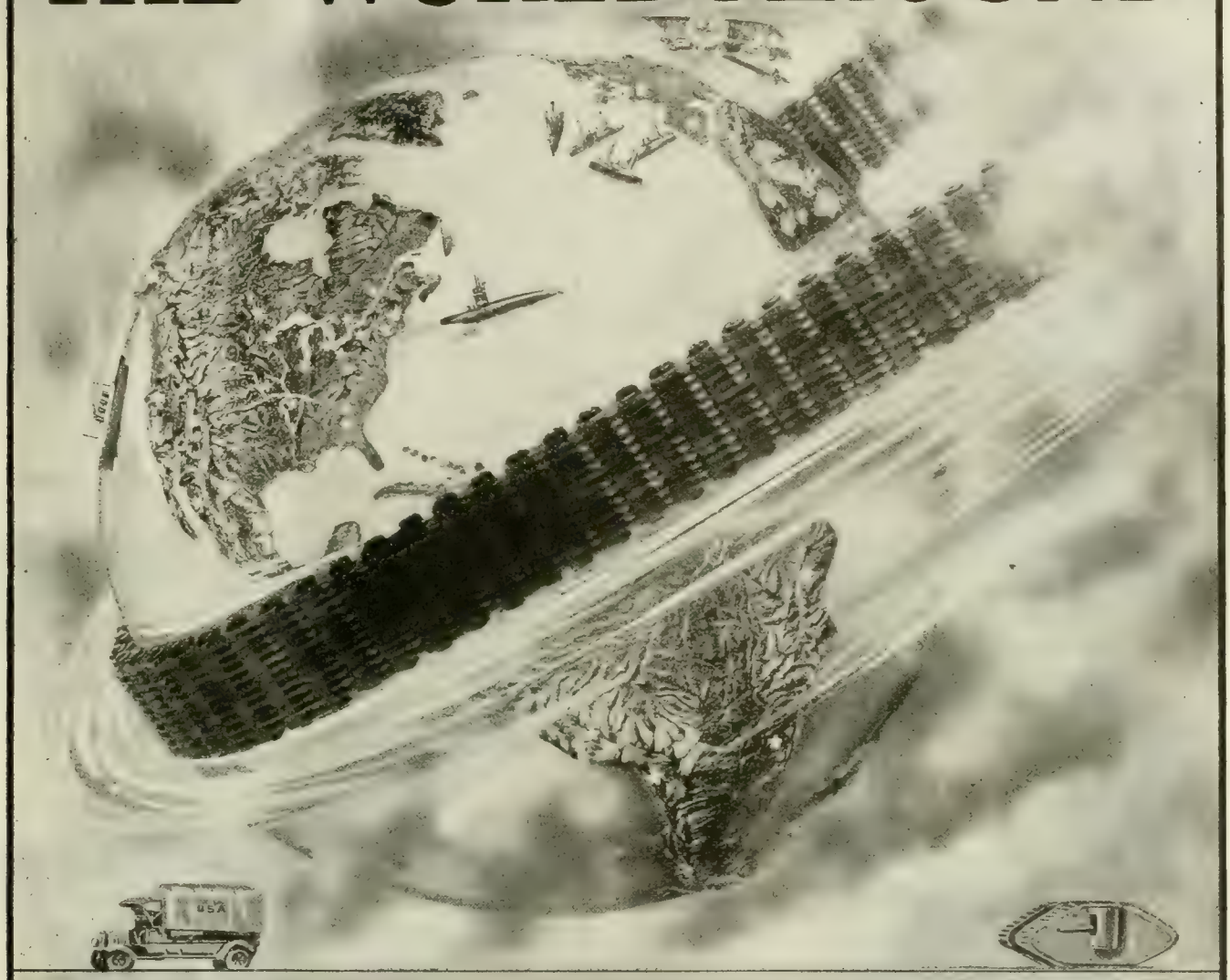

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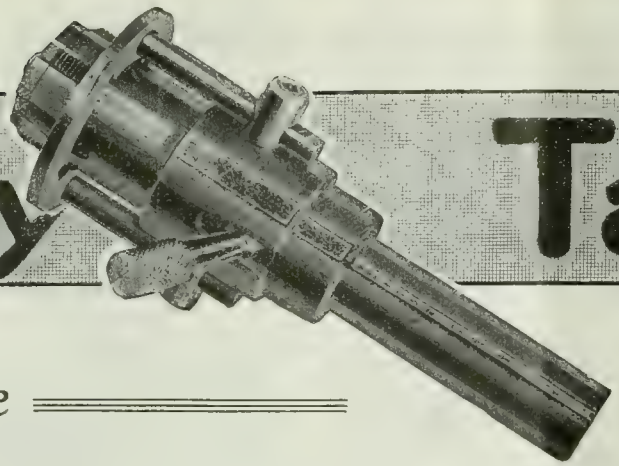
Murchey Taps



They are Collapsible

The only time they don't collapse or bend is under strain of heavy work and when in action. But for speedy adjustment, convenient, quick-acting operation, the collapsible and adjusting features stand prominently in the foreground.

The chasers are adjustable to compensate for any wear, and this feature enables the tap to maintain its minute accuracy, and adds to its general dependability.

The records performed by Murchey Taps on munitions work is equally prominent in general lines. They are built for service, and they give it.

We maintain a special chaser service for our clients that enable them to renew chasers at the minimum cost. Inquire immediately. Quick action means quick solution to your troubles.

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Bicknell-Thomas

Friction Chuck

not only prevents tap breakage but saves loss due to damaged parts and removing taps. It is the simplest Tapping Chuck made; it is the most efficient and fits any kind of machine. It can be used on multiple spindle drills or tapping machines, even when the spindles are close together.

Try one out on us. Write to-day for illustrated circular, describing same fully.

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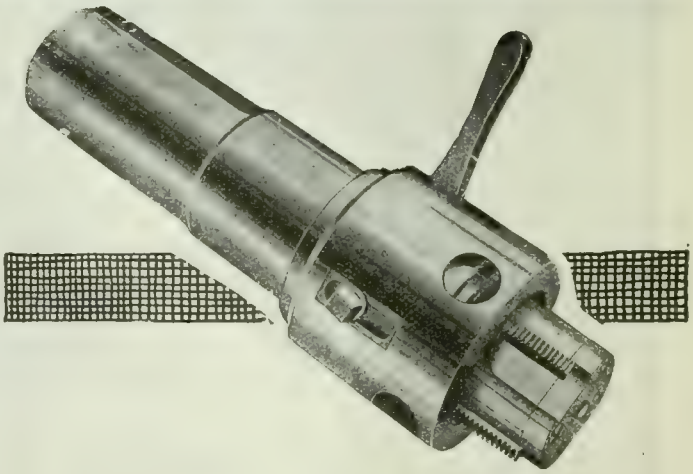

You have seen threads torn and roughed—the result of a tap clogging with chips when backing off. You have seen threads that no mechanic would call smooth and clean. But never have you seen anything but perfect threads in shops using Victor Collapsible Taps. Sizes 1¼" to 12". Moreover, Victor Collapsible Taps save fully half the time on threading operations.

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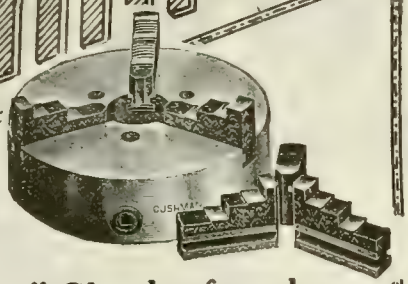
Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS

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Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9 16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

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Eastern Machine Screw Corp.

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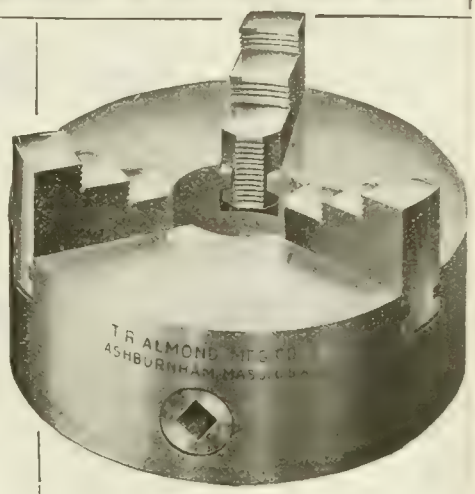
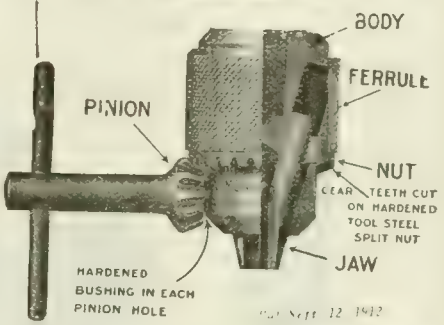
Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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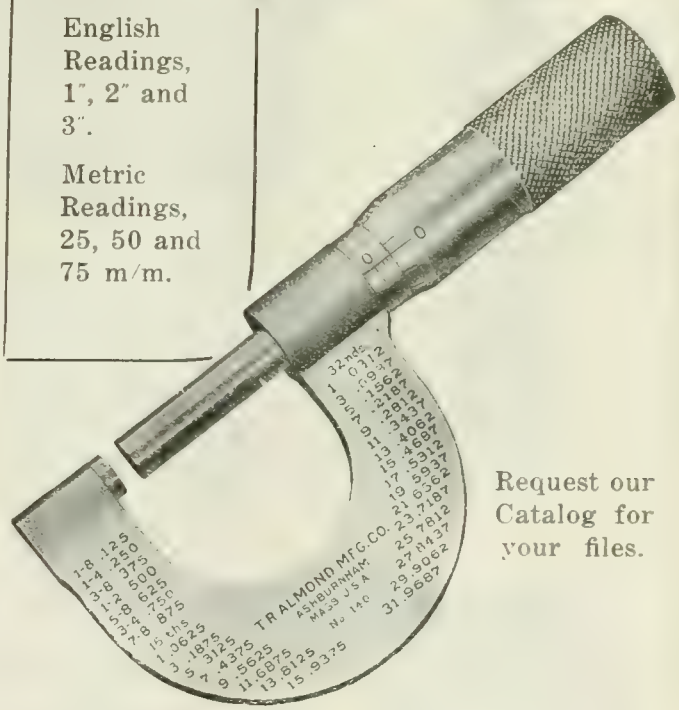

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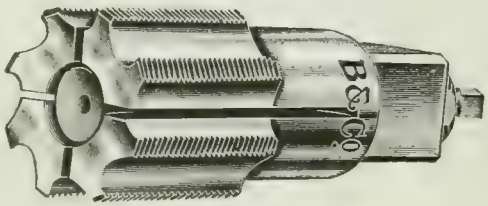
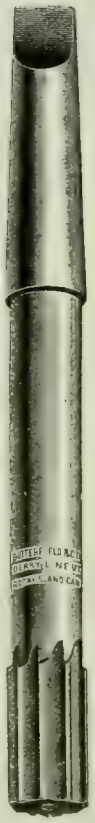


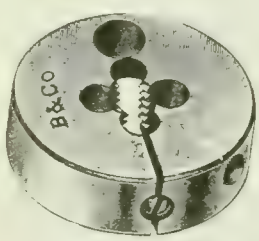


The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.



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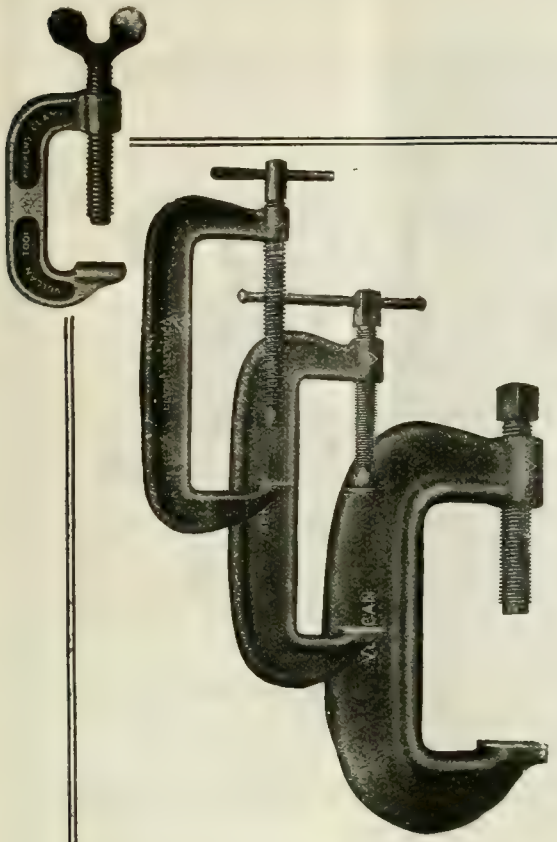

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Drop-Forged "C" Clamps
For Every Purpose

"They Stand the Strain"

Select the "C" Clamp best adapted to your needs. There's "A Williams' Clamp for every purpose."

For Tool Room work, requiring comparatively small opening of jaws, Williams' "Vulcan" Tool Makers' line should be chosen. 4 sizes, 1 to 4" capacities.

For stability and utility—medium service—Williams' "Agrippa" line offers the solution. 7 sizes, 4 to 18" capacities.

For extreme strength and heavy service Williams' "Vulcan" line provides abundantly for both. 11 sizes, ¾ to 12½ " capacities.

All are made of a special, high grade steel, and after forging are "heat-treated" to increase their toughness and strength.

Superior Machinists' Tools Booklet on request.

J. H. Williams & Co.

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Any Cut a Machine Can Pull or a Tool Stand, the "Knight" Chuck Can Hold

The "Knight" Three-Jaw, Universal Geared Chuck is solidly constructed, its properly proportioned jaws are exceedingly powerful, and the scrolls are very strong.

Characteristics, ease of control, prompt adjustment, adaptability and great gripping power.

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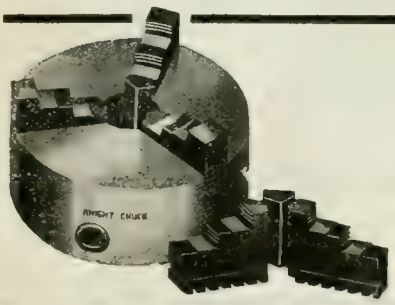

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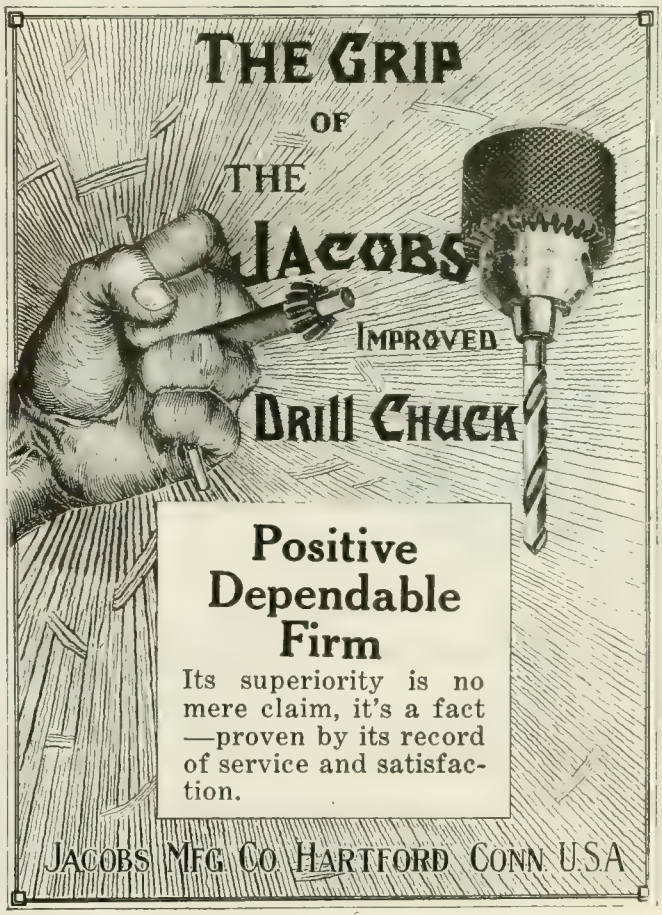

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"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
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For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

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Large Stocks maintained at convenient distributing centres throughout Canada

Look at this again —closely

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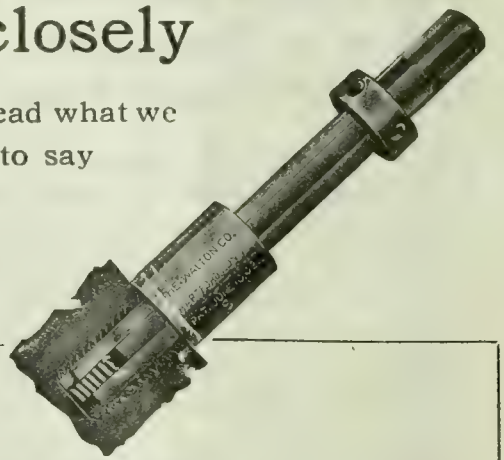

WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

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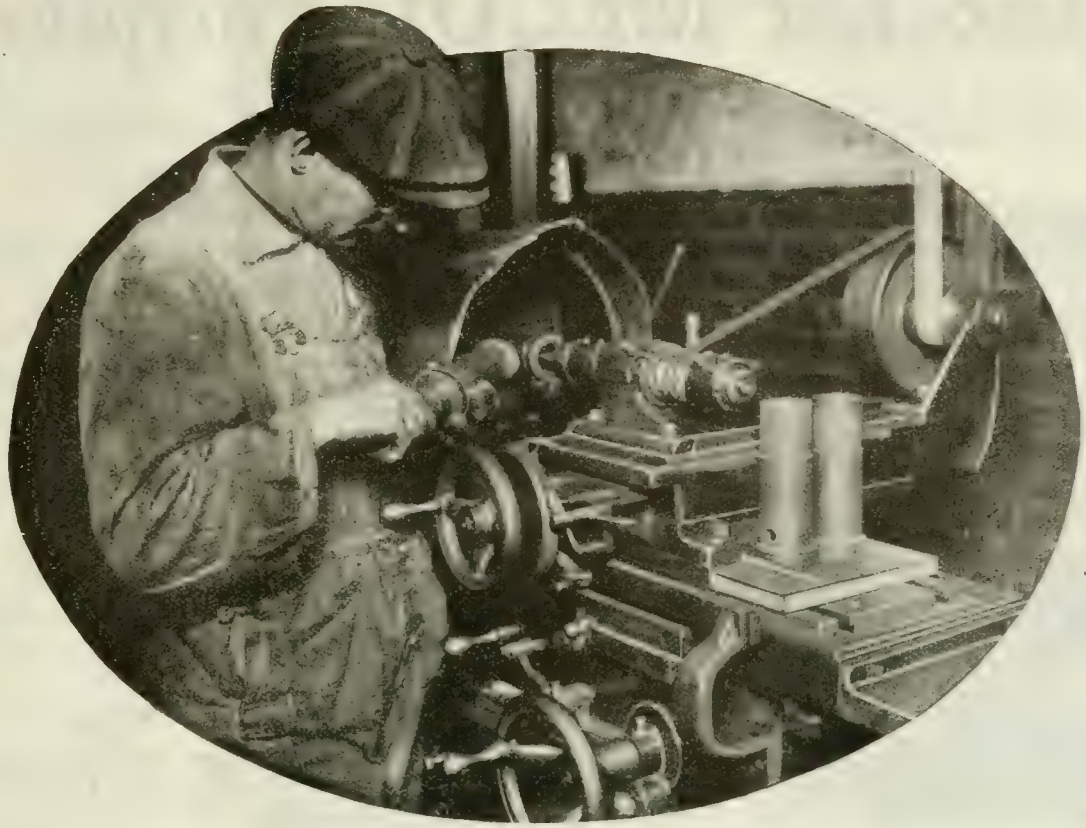
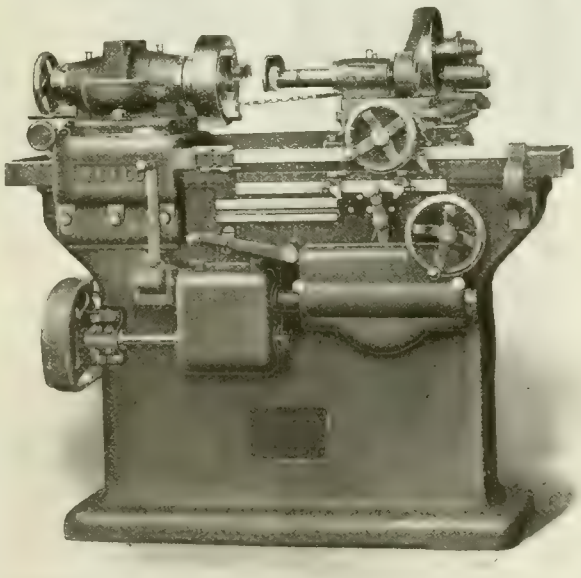


A Heald Internal Grinder Ten Years Old and Still on the Job

This internal grinding machine was installed at the Blanchard Machine Company's plant at Cambridge, Mass., ten years ago, and has been running continuously ever since on production and precision work.



In the above photograph this machine is grinding a steel sleeve from which it removes .025 inches of stock from a hole 1¾" diameter x 3¾" long to limits of plus or minus .0005 in 15 minutes.

Heald Internals are not limited to accuracy and production, but do angular and face grinding on all kinds of work. Different style heads, instantly interchangeable, make this machine practically a universal grinder.

Notice the lower cut and see if it is not a machine that you would be proud to have in your shop.

The Heald Machine Co.

Worcester Mass.

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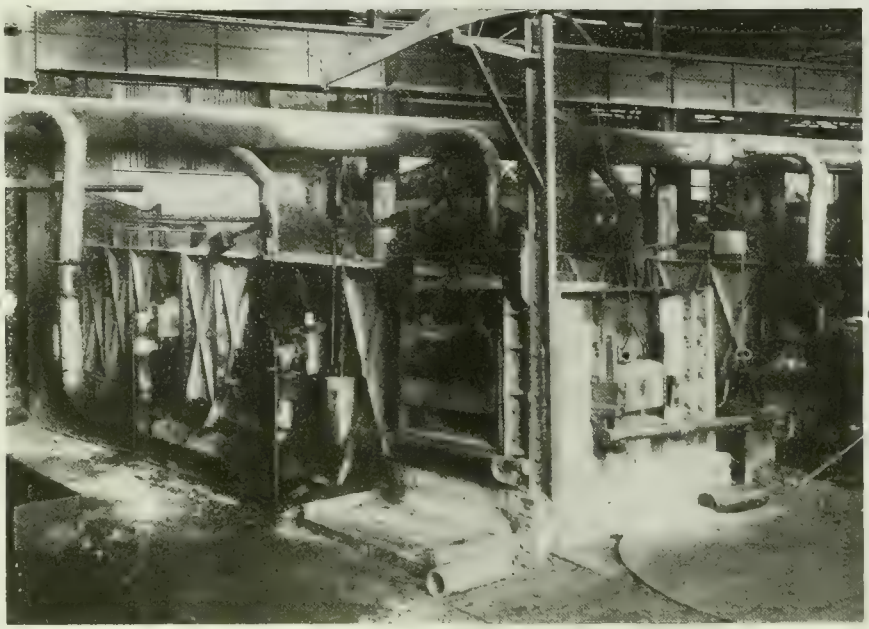
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

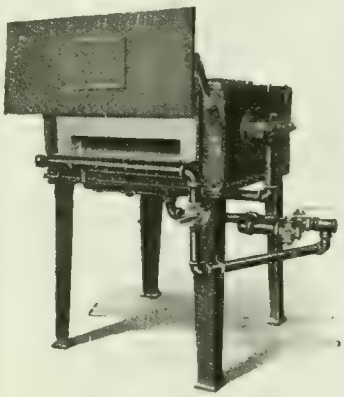
Write

Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

STANDARD FURNACES

OIL or GAS

Immediate delivery on all tool room types.



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Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

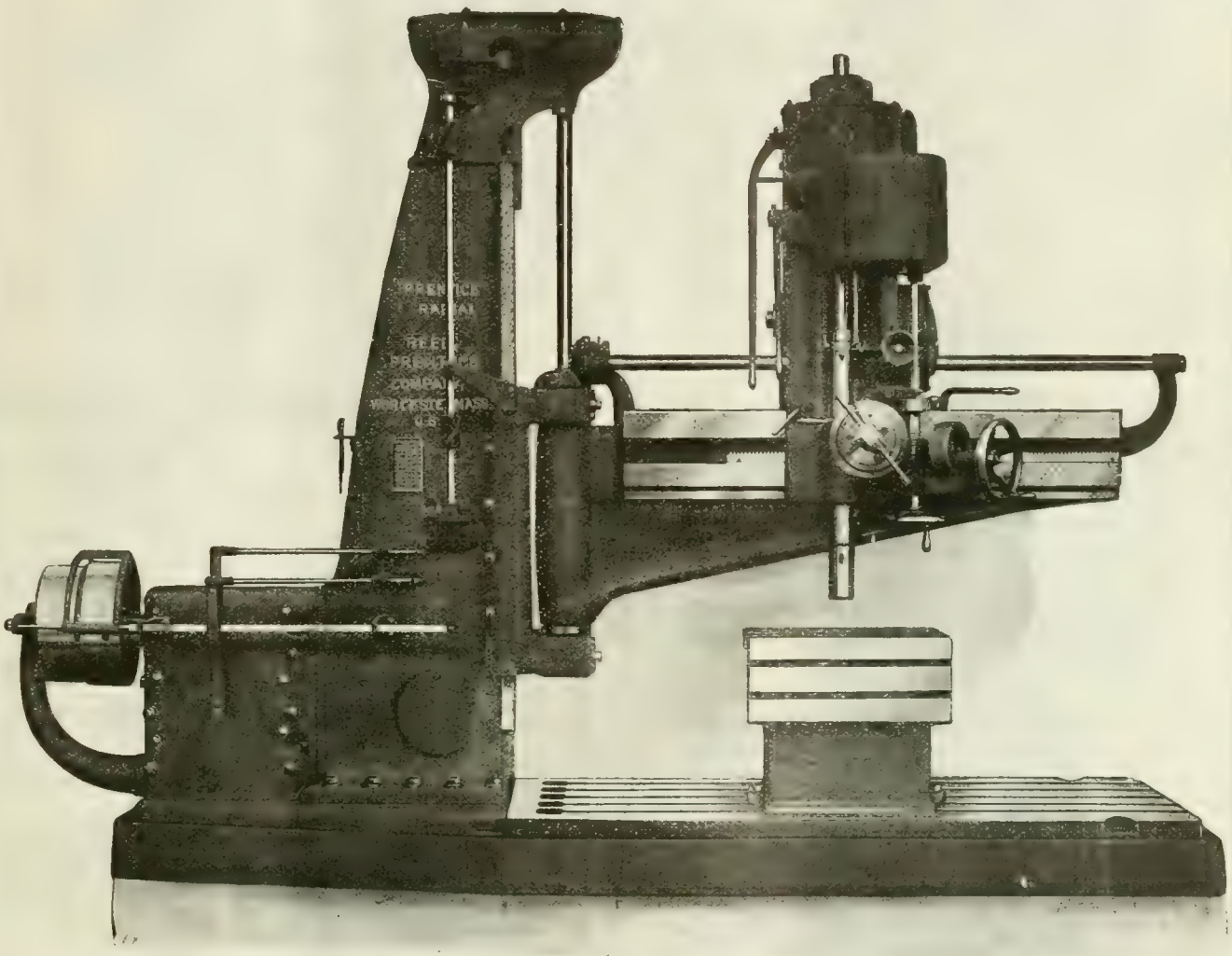
Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO
Alfred Herbert, Limited, Coventry, Agent for Great Britain

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



THE REED-PRENTICE RADIAL DRILLING MACHINE AS SEVERAL PATENTED FEATURES INCORPORATED IN ITS DESIGN WHICH ADD MATERIALLY TO ITS EARNING ABILITY.

WE WOULD BE PLEASED TO DEMONSTRATE THEM TO YOU. MAY WE HAVE THIS PRIVILEGE?

CANADIAN FAIRBANKS-MORSE CO., LIMITED
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES

If any advertisement interests you, tear it out now and place with letters to be answered.

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 22A

Repairing Taps

On the Grinding Wheel

The old mechanic was right when he said: "With a little horse sense and a grinding wheel a broken tap can be made as good as new."

First, square up the end on the face of the handiest tool-room grinding wheel (preferably Alundum). Then grind the relief (the chamfer). That is not so easy as it looks—it requires a little skill to get a radial relief and keep the cutting edges of the lands even. The two principal things to look out for are radial relief and even height of the lands.

Bear lightly with the wheel turning toward the cutting edge of the tooth; it gives a slightly better edge, free from burrs. But the tap must be held firmly enough, so that it will not accidentally be turned, carrying the cutting edge against the wheel. Keep turning slightly to get a radial relief. Light pressure and a cool, free-cutting Alundum wheel practically eliminate the danger of burning or drawing the temper.

On the ordinary tap, the relief or chamfer should be ground back four or five threads, although, sometimes, depending on the work, a six-thread taper is preferable. A broken tooth should be ground entirely away, leaving no jagged edges to tear the thread. When grinding in the flutes to resharpen dull teeth, eliminate nicks, or to remove the burrs, it is preferable to use a free-cutting wheel faced to conform to the shape of the flute. A tap will do the work required of it as long as there are three good threads left.

Alundum wheels are the right tool-room wheels. Vulcanite wheels are largely used for grinding the flutes of taps, and in some cases Vitrified grain 60 to 70, grades O to S, depending upon the method.

NORTON COMPANY

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WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Ingersoll File Company, Limited

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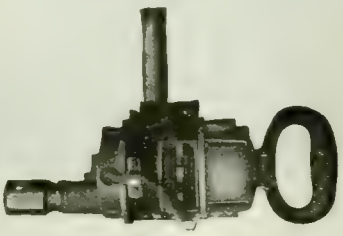
"ASK YOUR JOBBER"

IMPERIAL

TRADE MARK

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

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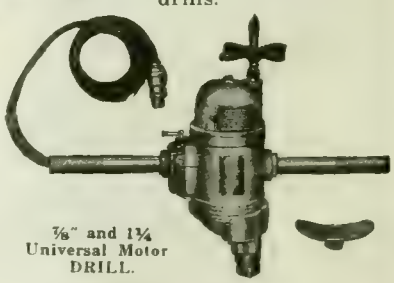

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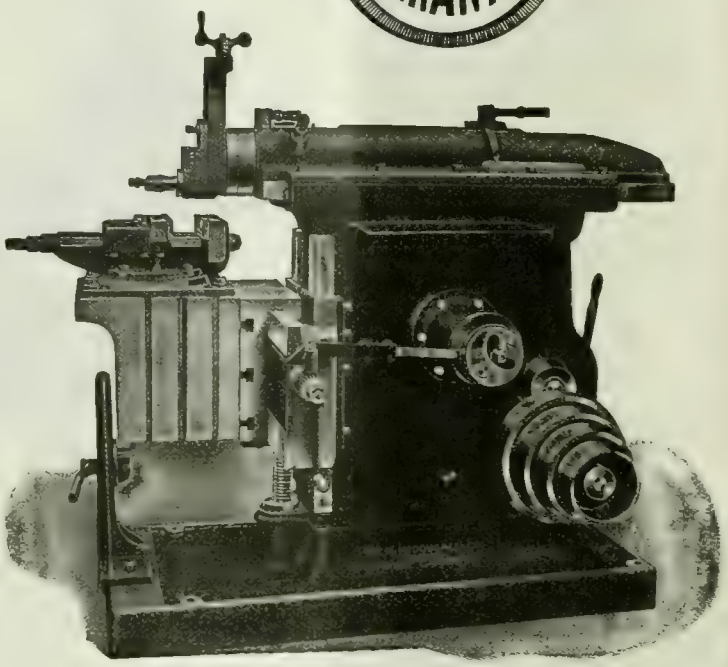

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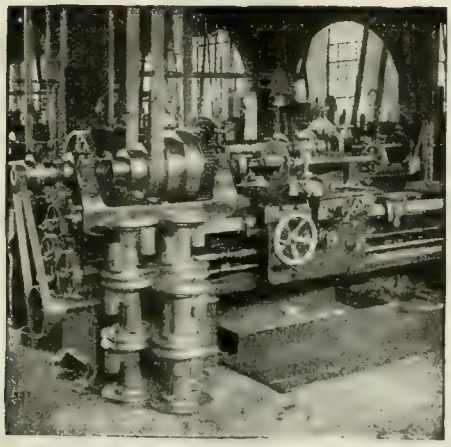

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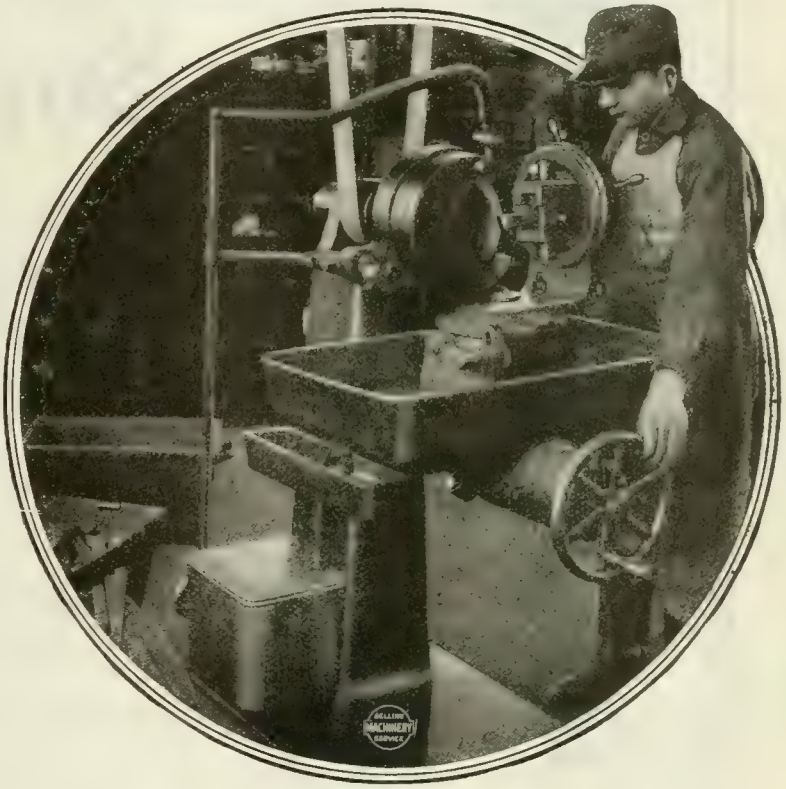

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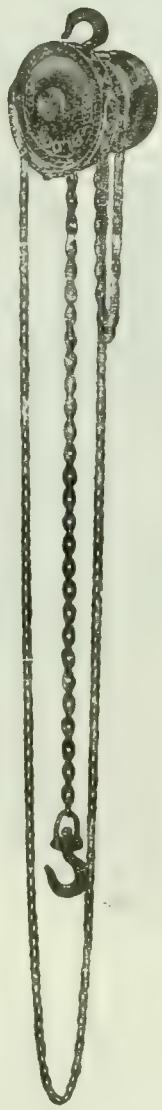

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The Bessemer Process of Steel Manufacture

How the Impurities Are Burned Out of Iron by One of the Most Spectacular Performances Known to the Trade—Story Told in An Interesting and Plain Manner

THE "Bessemer Process of Steel Manufacture" is dealt with in a most interesting manner by P. N. Case, editor of *The Dragon*, a little booklet issued monthly by the Fafnir Bearing Co., of New Britain, Conn. In an explanatory note, Mr. Case states that the idea is to make the matter descriptive and interesting, rather than putting it in such purely technical shape that only a technical man could appreciate it.

The year 1856, when Sir Henry Bessemer read his paper, "The Production of Pure Iron Without Fuel," marks an epoch in the history of the steel industry; for previous to the invention of the Bessemer Process, steel could not be produced economically, and wrought iron was extensively employed for purposes for which "soft" steel—that is, steel containing relatively small percentages of carbon—is now used almost universally. Not only did the Bessemer Process make possible the production of steel at lower cost than wrought iron could be produced, but the former is far superior for many purposes to wrought iron, which is apt to be considerably weakened through mixture with slag.

DEFINITION OF STEEL

In order fully to comprehend the principles involved in the manufacture of Bessemer Steel, it is essential that the reader appreciate the fundamental distinction between the two broad terms, "iron" and "steel." Chemically pure iron does not exist commercially, but is invariably associated with other elements in varying proportions. In other words, iron as we know it in everyday life, is in reality an alloy consisting chiefly of iron and much smaller percentages of several other constituents, such as carbon, silicon, manganese, phosphorus, and sulphur. Of these elements found in combination with iron, carbon is the most important, since it is the most useful and because it exerts the most powerful influence on the physical character of the metal. Broadly speaking, steel is simply pig iron (which is iron in the molten state as it is reduced in the blast furnace) containing relatively small percentages of those secondary elements, especially carbon While there is no sharp line of demarcation by means of which pig iron can be differentiated from steel, it will suffice for the purposes of this article to assume that pig iron which has been refined to the point where its carbon content is less than 1.5 per cent. becomes steel.

Therefore, the conversion of pig iron to steel is a process of refinement, consisting essentially in the removal of the excess of impurities. This is accomplished by oxidation, the volatile substances—such as the oxides of carbon—passing off as gas, while the solid oxides, being lighter than the metal, float on the surface of the bath from which they are easily separated. In all but the Bessemer Process this is a slow operation, and is accomplished in some sort of furnace with the addition of much heat from an external source. The Bessemer Process, however, makes use of a radically different principle, as we shall now see.

THE BESSEMER PROCESS

If we touch a lighted match to a scrap of paper, it burns quickly, accompanied by the liberation of considerable heat. Now when a piece of old iron rusts out in the dump, precisely the same thing happens—only more slowly. In both cases, oxidation takes place. Oxidation is the chemical reaction which occurs when some element, such as carbon or iron, combines with oxygen of the air, forming an oxide. The phenomenon of "burning" is merely very rapid oxidation. Moreover, when iron rusts, heat is generated, but is not noticeable because the process is so very gradual. However, if the iron or its impurities could be made to "burn," a vast amount of heat would be generated within a short space of time, and this is just what happens in the Bessemer Process

Pig iron is tapped from the blast furnace at approximately 1,400 degress Centigrade (2,552 degrees Fahrenheit), at which high temperature its several constituents will "burn" much the same as

the piece of paper just mentioned by way of illustration. Here the reader may wonder why the iron does not burn as soon as it leaves the blast furnace. The answer is simple. The oxygen of the air does not penetrate throughout the molten mass, but merely comes in contact with the surface of the metal. A simple illustration will serve to make this point clear. The coal on the grate of a locomotive, for example, would not burn to any extent if the air merely passed over its surface. It is necessary that a strong current of air be forced up through the grate bars and the overlying layers of coal. In fact, in every boiler plant where coal must be burned rapidly, provision must be made to obtain a strong draft. In this way two things are accomplished: first, a large amount of air is provided, containing sufficient oxygen to facilitate rapid "burning" of the coal; second, the air is brought into intimate contact with every particle of coal. This last consideration is just as important as the first; for obviously, the coal cannot be oxidized (burned) if oxygen does not come in contact with it. The same principle holds good in the case of pig iron; it is only necessary to force a large enough quantity of air all through every particle of the hot, molten mass, in order to make it "burn."

However, there is another factor of fundamental importance in its influence on the Bessemer Process —indeed, the process could not possibly exist otherwise—which I shall now explain. At the particular temperature at which pig iron is tapped from the blast furnace, the impurities—such as silicon, manganese and carbon—have a greater affinity for oxygen than has the metallic iron itself. Consequently, if a strong blast of air is forced through a mass of pig iron, those impurities will "burn" before the iron does. Moreover, some of the oxides thus formed are volatile and vanish of their own accord, while the others which are liquid are lighter than the molten metal and, consequently, rise to the surface, forming a viscous layer of scum (slag) on top of the metal. This slag can then easily be separated from the metal.

It was these principles which inspired Sir Henry Bessemer to conceive the method which bears his name of converting pig iron into steel. As practised in America, 10 or 12 tons of pig iron are placed in an eggshaped converter, or vessel, of suitable size, and an air blast injected through the bottom. When the impurities have been oxidized or "burned" (which requires only about 15 minutes) and separated from the bath, the remaining metal is as nearly chemically pure iron as is ever attained, except, possibly, in the experimental laboratory. It remains only to calculate and add to the metal the proper proportions of carbon, silicon, manganese and any other elements desired, to give the steel the composition which has been definitely predetermined. This operation is known as "recarburization."

The "burning" of the impurities in the pig iron results in the generation of a vast amount of heat, some of which is lost in the surrounding atmosphere, while the balance serves to raise the temperature of the molten metal to a "white" heat. This is very fortunate, since when the impurities are "burned" out of the pig iron, the melting point of the metal becomes much higher, and it is essential that the steel be liquid when finished, in order that it will flow freely. The final step consists in pouring the liquid steel into molds, which are withdrawn as soon as the metal is sufficiently chilled. The steel ingots are then ready to be transferred to the rolling mill where they are rolled into sheets or billets for commercial use.

From the above outline, it will be evident that the outstanding features of the process are: the rapidity with which pig iron can be converted into steel; the fact that no fuel is required, other than that contained in the pig iron itself in the form of impurities; and that the pig iron thus refined does not have to be remelted.

PHOSPHORUS AND SULPHUR

Before concluding this introductory chapter, however, it will be well to note that there are two variations of the Bessemer Process. The one originally developed is known as the "Acid" Bessemer Process, and by this method, neither phosphorus nor sulphur can be eliminated from the pig iron and discarded in the slag with the other impurities. However, both phosphorus and sulphur greatly injure steel; the former makes the metal "cold short," or brittle when cold and, therefore, liable to fracture; the latter makes steel "red short," which means that it is brittle while hot and, consequently, cannot safely be forged. Therefore, it is of paramount importance that the pig iron used shall contain no larger percentages of those two elements than are allowable in the finished steel. For commercial purposes, the standard limits are 0.1 per cent. phosphorus and 0.8 per cent. sulphur. Pig iron which comes within those limits is known as "Bessemer Pig Iron."

A modification of the "Acid" Process, known as the "Basic" Bessemer Process, was subsequently developed, by means of which virtually all of the phosphorus and most of the sulphur can be removed from the pig iron. However, only pig iron which contains very little silicon and a relatively high percentage of phosphorus can advantageously be treated by this process. In Europe, where pig iron of this character is available at a low price, the Basic Process is extensively used. In fact, it is hardly an exaggeration to say that the Basic Bessemer Process has been one of the salient factors contributing to Germany's industrial development during the past generation. On the other hand, in the United States, where iron ore containing very little phosphorus is more abundant, the Acid Bessemer Process is exclusively employed.

Ball Bearings in Tractor Design

Arduous Nature of Work Necessitated by Rough Ground Makes Ball-Bearings Particularly Adaptable to Tractor Work — Reprinted From "Tractor and Trailer"

By H. M. TRUMBULL

AS the tractor is one of the most expensive of agricultural machines, the farm operator has now learned to make a careful study of its mechanical features before purchasing. If he were buying a one-season machine, or if first cost were the only consideration, the selection of his tractor would be a comparatively simple matter, but as he is looking for permanent value he investigates the details which insure reliability and dependable service.

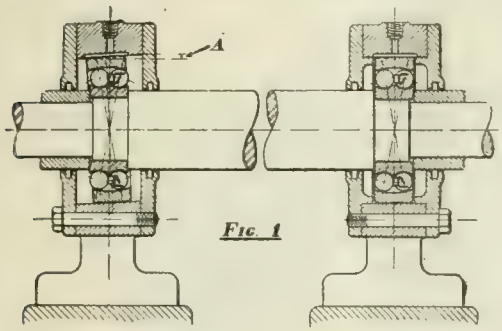


FIG. 1

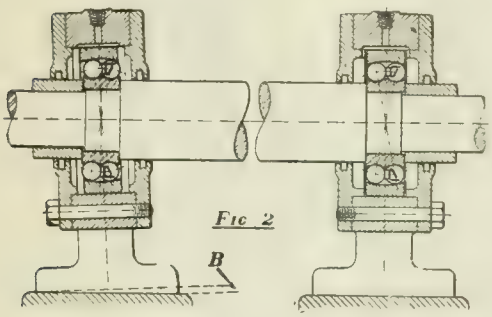


FIG. 2

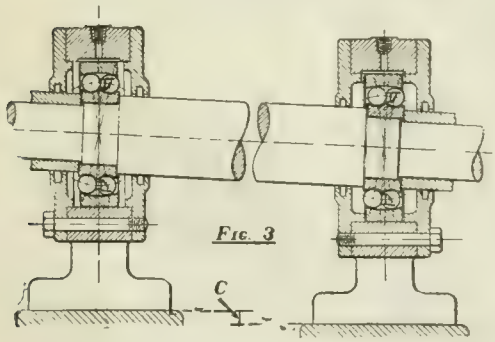


FIG. 3

In order to operate successfully, a tractor must be designed for durability and strength combined with flexibility. Reduction in operating and maintenance cost is also of vital consideration. The use of high grade ball bearings of the self-aligning type is a long step toward the fulfilment of these requirements.

The exacting conditions of rough, undeveloped country are a severe test for any machine. What happens when a tractor strikes a rock or stump or drops into a furrow? Are undue strains then placed upon the vital parts of the mechanism? Such loads, strains and vibrations are carried to a large extent by the bearings.

A farm tractor from the nature of its work receives much abuse. The ground upon which it travels necessitates a method of compensating for shaft distortions. When the wheels are in a furrow these shaft distortions are enormous and unless compensated for by self-aligning ball bearings, friction and binding strains will increase and the cost per tractor hour will rise. It is therefore folly to economize on bearings. Only the best should be used.

How about the cost of ball bearings? True, the initial price of these bearings is more. But in considering the factor of cost of bearings this item should include not only the first cost, but also the cost of replacements and repairs for the period of years that the tractor is in service; i. e., the value of a ball bearing is not in the price paid for it, but in the combination of price with service obtained.

Another angle on the cost question: If a $1,000 tractor will deliver 3,000 lbs. at the draw-bar the cost per lb. of draw-bar pull is $.333. If by equipping this tractor with ball bearings the draw-bar pull is increased 10 per cent. at a cost of $50, the additional 300 lbs. cost but $.166 per lb. The cost per lb. of draw-bar pull and the cost of operation are factors which are being weighed by the purchaser, and ball bearings give the maximum period of service and the minimum cost of operation.

Another important feature is the lubricant saving. Ball bearings are enclosed in tight housings, which keep the lubricant in and the dust and dirt out. These bearings need no other attention than a change of lubricant once a season.

The following engineering data and the accompanying illustrations will prove of interest to tractor designers:

The first six figures show how various inaccuracies in mounting may be overcome by the use of self-aligning ball bearings.

Figure 1 shows the result of inaccurate boring. The right-hand pillowblock is perfectly bored; the left-hand one is not, as shown at A. Note how the ball bearing compensates for this, due to the self-aligning feature. Any other bearing would bind under such conditions. But self-aligning ball bearings cannot bind.

These ball bearings operate in spite of such inaccuracies. They will operate without trouble of any kind under such conditions—conditions that would ruin any other bearing.

Figure 2. Again we have inaccurate machining. This time the base of the left-hand pillowblock is not machined correctly, as shown at B. This throws the pillowblock out of line. But due to the self-aligning construction, the bearing runs perfectly free under these conditions. Note that the shaft is perfectly horizontal.

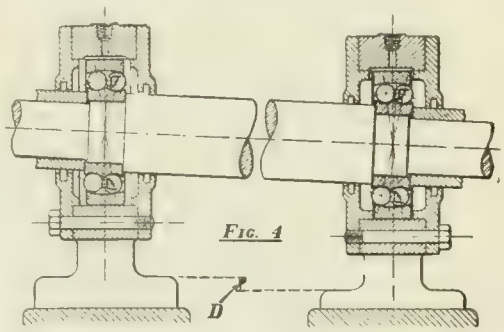


FIG. 4

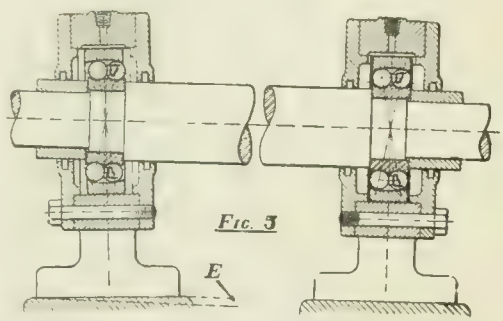


FIG. 5

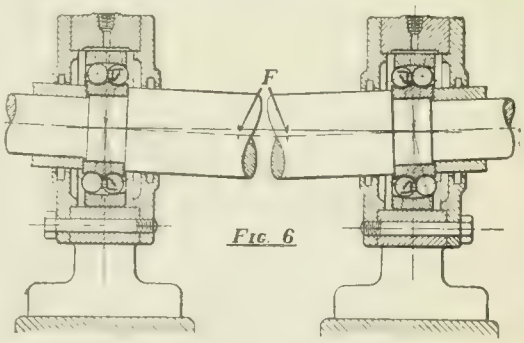


FIG. 6

Figure 3 shows what happens when the tractor frame weaves. The channel section carrying the right-hand pillowblock has dropped the distance shown by C. Any other bearing would bind and heat under this condition. But notice how both ball bearings have rotated in the spherically ground outer race to align themselves properly. As soon as

the frame returns to normal position the ball bearings will also turn to that position. This is the advantage of instantaneous, automatic self-alignment.

solutely horizontal, although the frame is twisted and the left pillowblock is not vertical. No other bearing made will compensate for twisting like this.

freedom, even though it is deflected or sprung.

Figure 7. Figure 1 of Figure 7 shows the standard shaft shoulder and housing

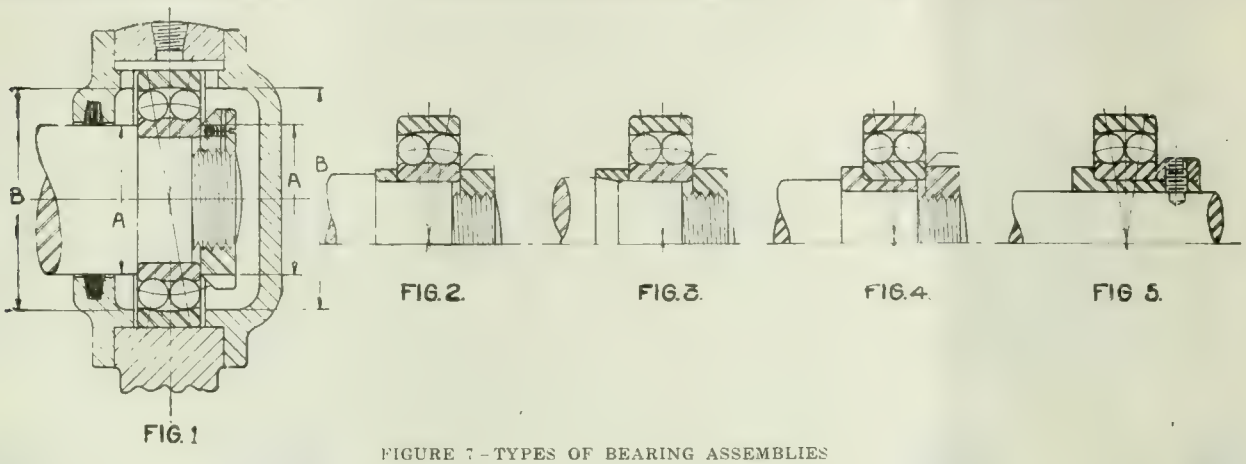


FIG. 1 FIG. 2. FIG. 3. FIG. 4. FIG. 5.

FIGURE 7 - TYPES OF BEARING ASSEMBLIES

Figure 4 shows another example of improper machining. Too much metal has been removed from the base of the right-hand pillowblock. The amount is

Figure 6 shows deflection due to a heavy load on the shaft. Note that both pillowblocks are vertical, although the shaft is deflected. Note also that the

shoulder. A table of dimensions giving correct shoulder sizes for all bearing sizes is also given in Figure 8.

Where it is impossible to use a shaft

Bearing No.	1200—1500—2200				1300—1600—2300				400				1400			
	A		B		A		B		A		B		A		B	
	Max.	Min.	Min.	Max.	Max.	Min.	Min.	Max.	Max	Min.	Min.	Max	Max.	Min.	Min.	Max.
0	13/32	5/16	23/32	11/16	23/32	5/16	1 1/16	1 5/32	23/32	23/32	1 11/32	1 13/32	23/32	23/32		
1	11/16	21/32	1	1 5/32	21/32	21/32	1 5/32	1 7/32								
2	13/16	25/32	1 3/16	1 5/32	25/32	25/32	1 5/16	1 3/8	25/32	25/32	1 11/16	1 3/4	25/32	25/32	1 1/16	1 11/32
3	13/16	7/8	1 3/32	1 5/16	1 1/32	7/8	1 5/32	1 3/32	1 1/32	7/8	2	2 1/8	1 1/32	7/8	1 7/32	2 1/16
4	1 1/32	1 1/32	1 1/32	1 9/16	1 1/16	1 1/32	1 1/32	1 5/16	1 1/8	1 1/32	2 1/16	2 1/32	1 1/32	1 1/32	2 1/32	2 1/32
5	1 9/32	1 7/32	1 13/32	1 23/32	1 1/16	1 7/32	2	2 1/16	1 9/32	1 7/32	2 7/32	2 11/32	1 7/32	1 7/32	2 5/16	2 7/16
6	1 5/16	1 1/32	2 1/32	2 1/32	1 5/8	1 1/32	2 1/16	2 1/16	1 5/8	1 1/32	2 1/32	3 1/16	1 5/16	1 1/32	2 1/16	3 1/16
7	1 11/32	1 11/16	2 5/16	2 7/16	1 11/32	1 11/16	2 5/16	2 5/16	1 11/32	1 11/16	3 3/16	3 1/2	1 11/32	1 11/16	3 3/32	3 5/16
8	2 1/16	1 13/16	2 5/8	2 13/16	1 13/16	1 13/16	2 5/16	3 1/8	1 13/16	1 13/16	3 7/32	3 7/8	2 5/8	1 13/16	3 5/16	3 11/16
9	2 3/32	2 3/32	2 21/32	3	2 5/8	2 3/32	3 1/16	3 1/2	2 5/8	2 3/32	4	4 1/4	2 5/8	2 3/32	3 7/8	4 1/16
10	2 5/32	2 11/32	3 7/32	3 3/8	2 11/32	2 11/32	3 5/8	3 11/16	2 11/32	2 11/32	4 11/32	4 5/8	2 11/32	2 11/32	4 3/8	4 5/8
11	2 3/4	2 5/8	3 3/8	3 1/2	2 23/32	2 23/32	3 11/32	4 3/32	2 23/32	2 23/32	4 11/16	5	2 23/32	2 23/32	4 7/16	5
12	3	2 3/4	3 11/16	3 1/2	3 3/32	2 3/4	4 1/32	4 1/32	3 3/32	2 3/4	5	5 1/16	3 3/32	2 3/4	4 3/4	5 1/16
13	3 1/4	3	4 1/16	4 3/16	3 11/32	4 11/16	4 1/2	4 1/2	3 11/32	3	5 5/16	5 3/4	3 11/32	3	5 1/4	5 5/8
14	3 15/32	3 7/32	4 9/32	4 13/32	3 11/16	3 7/32	5 3/32	5 1/4	3 11/16	3 1/32	6	6 1/8	3 11/16	3 1/32	6	6 1/2
15	3 11/16	3 3/8	4 1/2	4 5/8	3 23/32	3 3/8	5 5/16	5 5/8	3 23/32	3 3/8	6 1/8	6 3/4	3 23/32	3 3/8	6 1/4	6 3/4
16	3 23/32	3 13/32	4 25/32	4 25/32	4 5/32	3 13/32	5 23/32	6	4 5/32	3 13/32	6 11/16	7 1/4	4 5/32	3 13/32	6 11/16	7 1/4
17	4 3/16	3 7/8	5 1/8	5 1/4	4 11/32	3 7/8	6 3/32	6 3/8	4 11/32	3 7/8	7 1/8	7 1/2	4 11/32	3 7/8	6 11/16	7 3/4
18	4 7/16	4 1/8	5 1/32	5 1/32	4 5/8	4 1/8	6 3/4	6 3/4	4 5/8	4 1/8	7 1/32	8 1/16	4 5/8	4 1/8	7 1/32	8 1/16
19	4	4 5/16	5 3/32	6	4 27/32	4 5/8	6 23/32	7 1/16	4 27/32	4	7 1/16	8 1/16	4 27/32	4 5/8	8 3/16	9
20	4 29/32	4 13/32	6 5/32	6 5/16	5 1/32	4 13/32	7 7/32	7 5/8	5 1/32	4 13/32	8 5/8	9 1/8	5 7/32	4 13/32	8 11/16	9 1/16

Table giving Proper Shaft and Housing Shoulders in inches.

FIGURE 8

shown at D. This is magnified above what it would be in practice to show what the result is. The centres of the two bearings do not lie on a horizontal line. The centre of one is below the centre of the other. In ordinary bearings this means binding and finally bearing failure. But with the shaft carried on self-aligning ball bearings the shaft turns perfectly. There can be no binding and no heating.

Figure 5 shows the left-hand section of the frame twisted slightly as at E. This is a condition every tractor must meet. In a tractor that uses self-aligning ball bearings there can be no trouble, since the bearing will align itself, as shown in the left-hand pillowblock. Note that the pillowblock and the outer race of the bearing have turned as the frame twisted; but the balls and inner race of the bearing have remained in their original position. The shaft is an inner race and balls of the ball bearing have turned in the outer race. There is no strain on the bearings due to bending. The shaft will turn with absolute

large enough to provide the correct shoulder it becomes necessary to use the methods shown in Figures 2, 3, 4 and 5 Figure 2 shows the sleeve between bearing and shoulder. Figure 3 shows the type of sleeve to use when a sudden reduction in section would weaken the shaft. Figure 4 illustrates a sleeve that extends through the bearing and seats against a shoulder. Figure 5 shows a sleeve used without a shaft shoulder.

All these sleeves are pressed onto the shaft and then turned to size. The bearing is then given a light tapping fit on either shaft or sleeve, as the case may be.

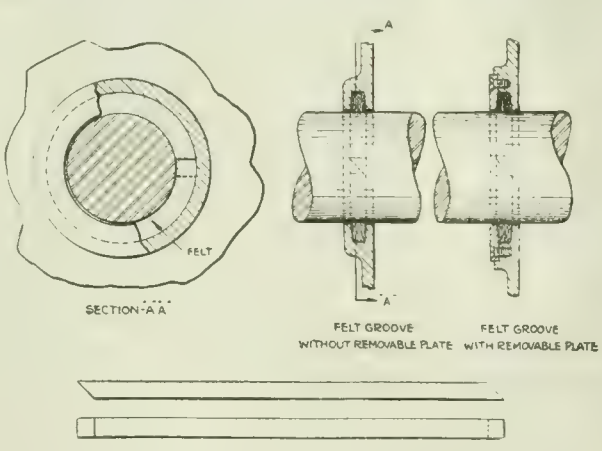


FIGURE 9—FELT GROOVE DETAILS

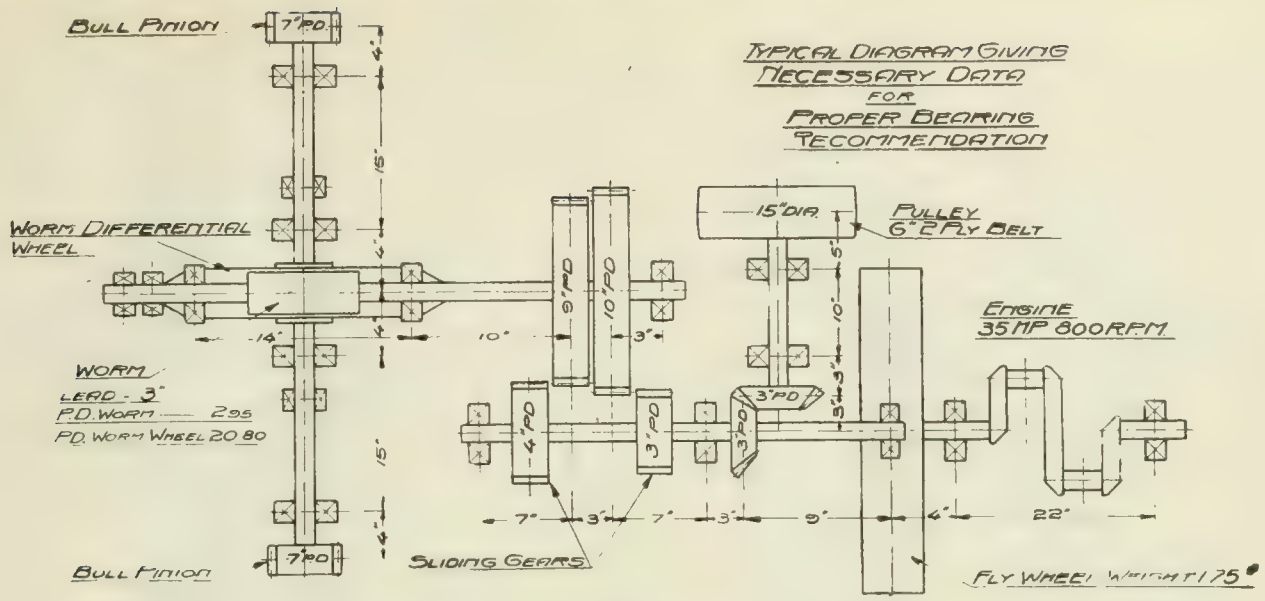
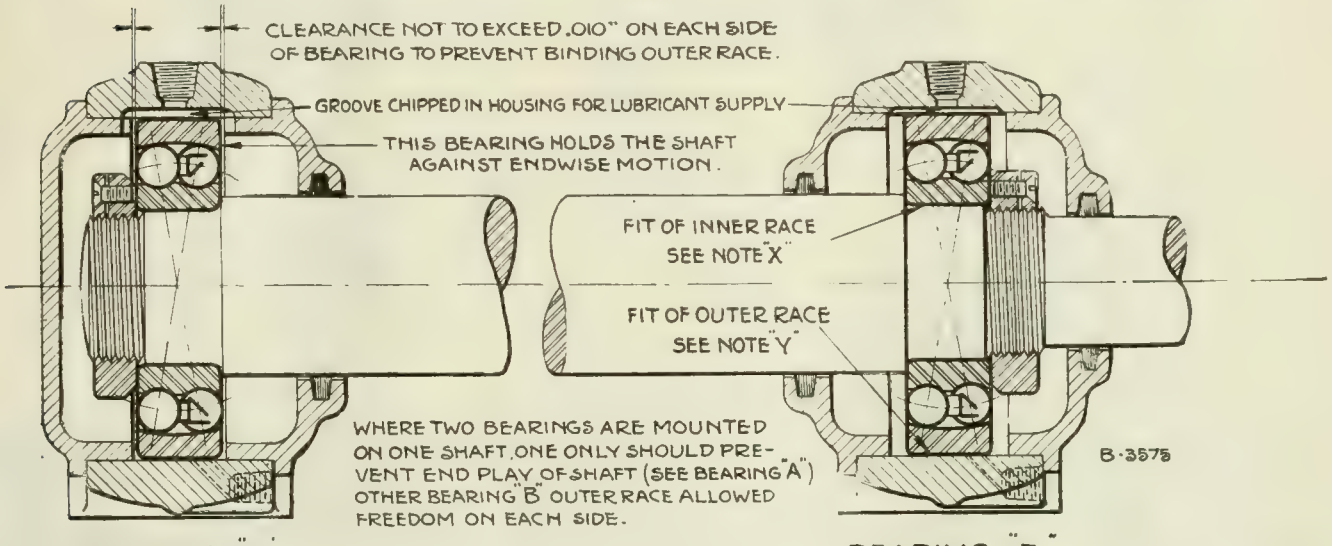


FIGURE 10


CLEARANCE NOT TO EXCEED .010" ON EACH SIDE OF BEARING TO PREVENT BINDING OUTER RACE.
GROOVE CHIPPED IN HOUSING FOR LUBRICANT SUPPLY
THIS BEARING HOLDS THE SHAFT AGAINST ENDWISE MOTION.
FIT OF INNER RACE SEE NOTE "X"
FIT OF OUTER RACE SEE NOTE "Y"
WHERE TWO BEARINGS ARE MOUNTED ON ONE SHAFT, ONE ONLY SHOULD PREVENT END PLAY OF SHAFT (SEE BEARING "A") OTHER BEARING "B" OUTER RACE ALLOWED FREEDOM ON EACH SIDE.
B-3575
BEARING "A"
BEARING "B"

Note "X"—Inner race should be a light tapping fit on the shaft. Note "Y"—Outer race should be a sucking fit in the housing.

This figure shows the mounting details of a shaft carried by two bearings.

FIGURE 11

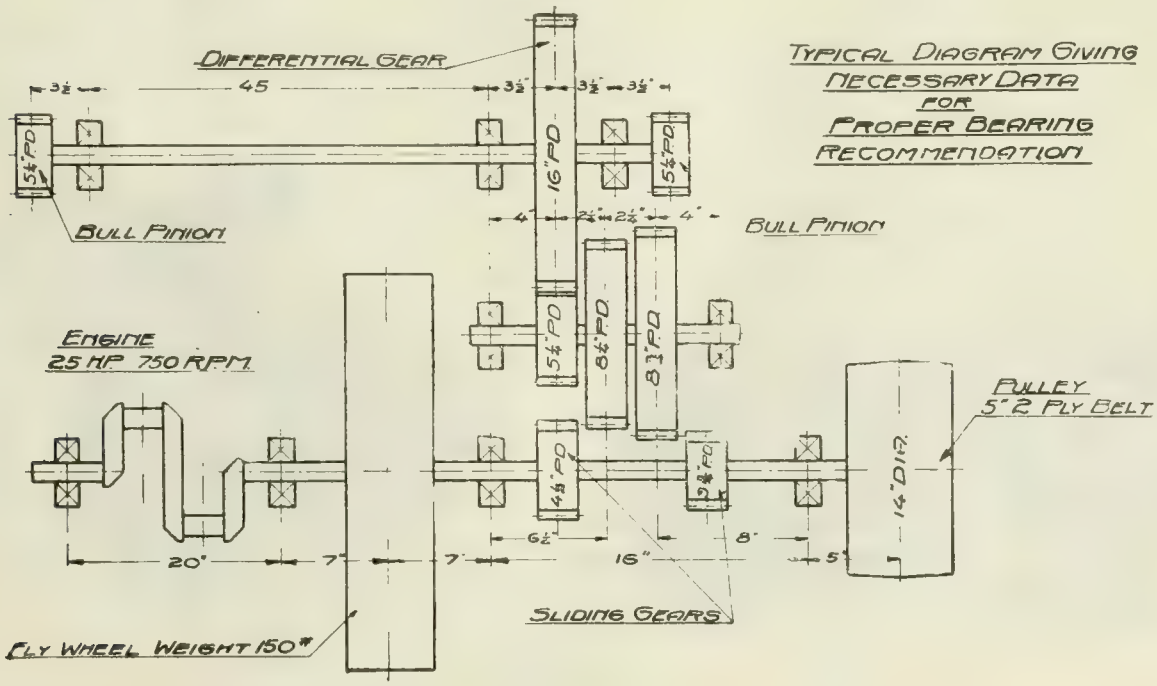


FIGURE 12

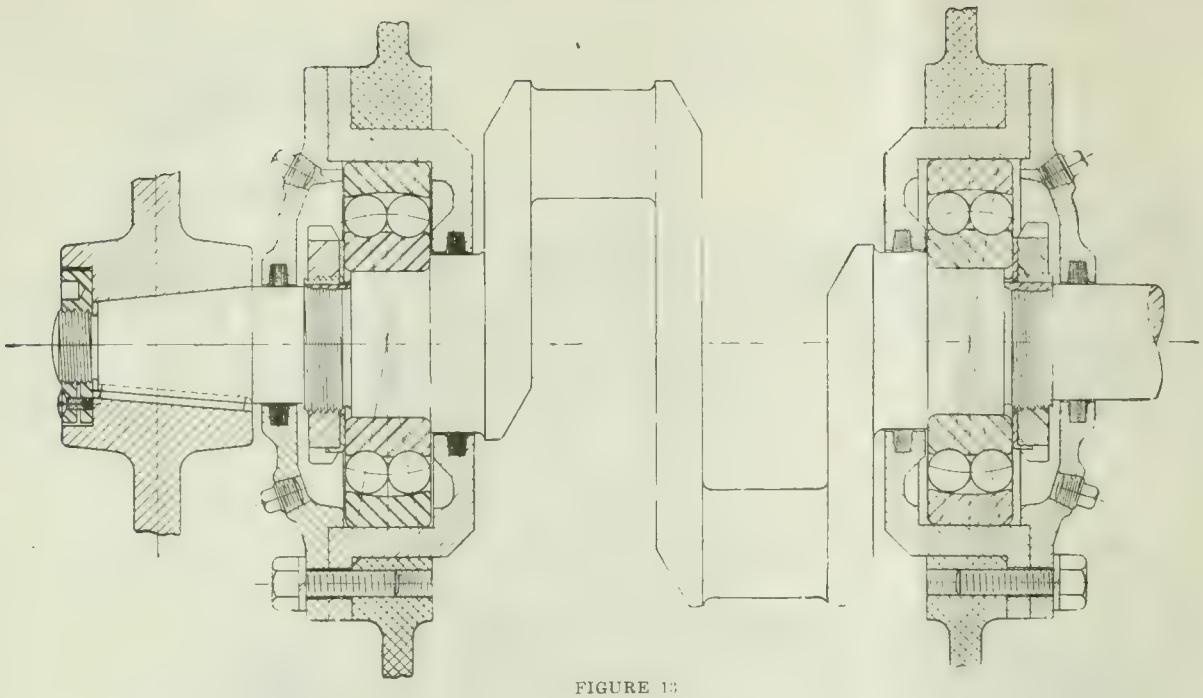


FIGURE 13

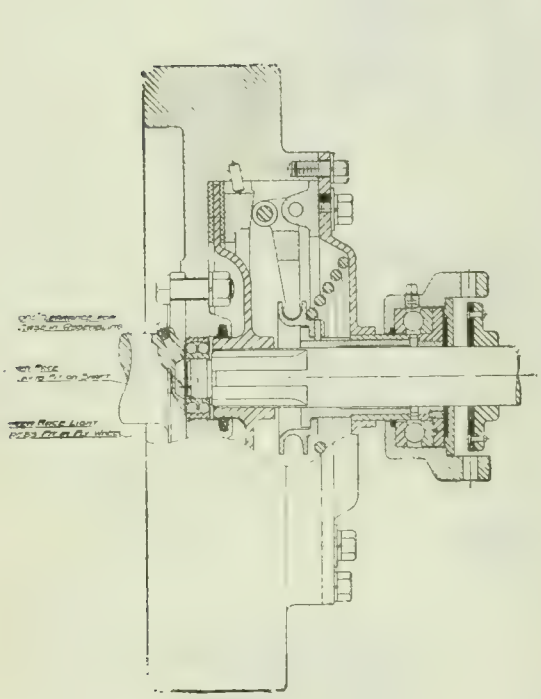


FIGURE 14

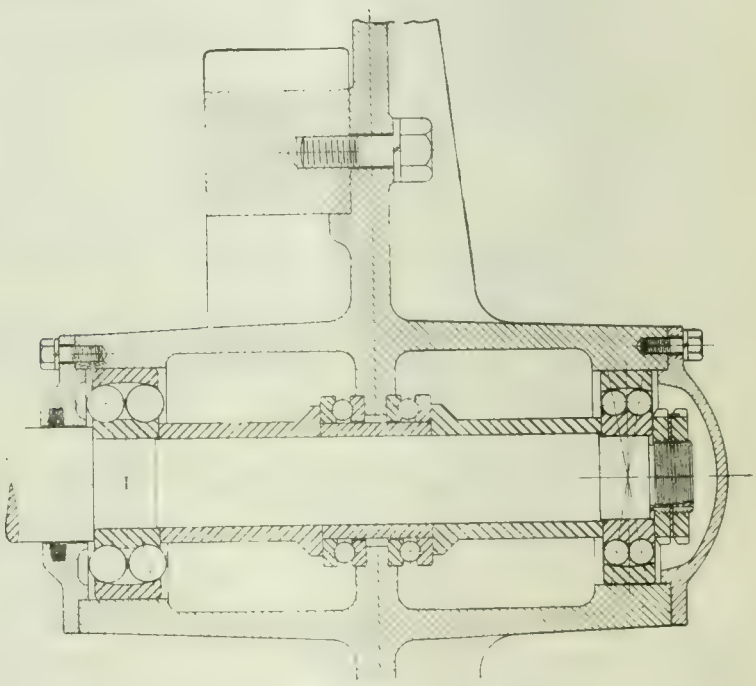


FIGURE 15

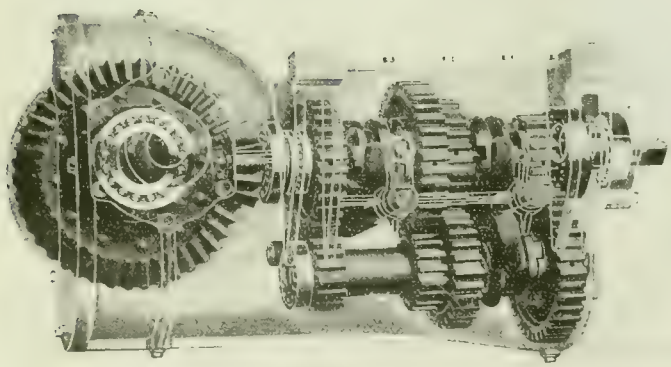


FIGURE 20

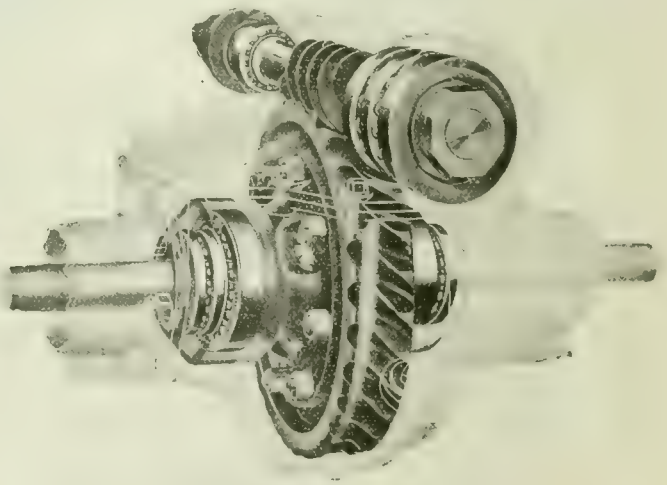


FIGURE 21

The construction shown in Figure 1 is, however, the simplest and best and should always be used if possible.

In Figure 9 are shown two types of felt grooves. One has a removable plate and one is solid. The advantage of the removable plate type is that the felt can be removed and renewed without removing the shaft. In the solid type this can not be done, but the solid groove does not need as much machining, and is, therefore, easier to make.

Notice in the mounting shown in Figure 11 the left-hand bearing is not held, but the right-hand bearing is held to stabilize the shaft against end-wise motion. The mounting is exceedingly simple, efficient and reliable.

Figure 14 shows a typical clutch mounting showing the location of the ball bearings. The self aligning radial ball bearing is rapidly becoming the

Continued on page 187

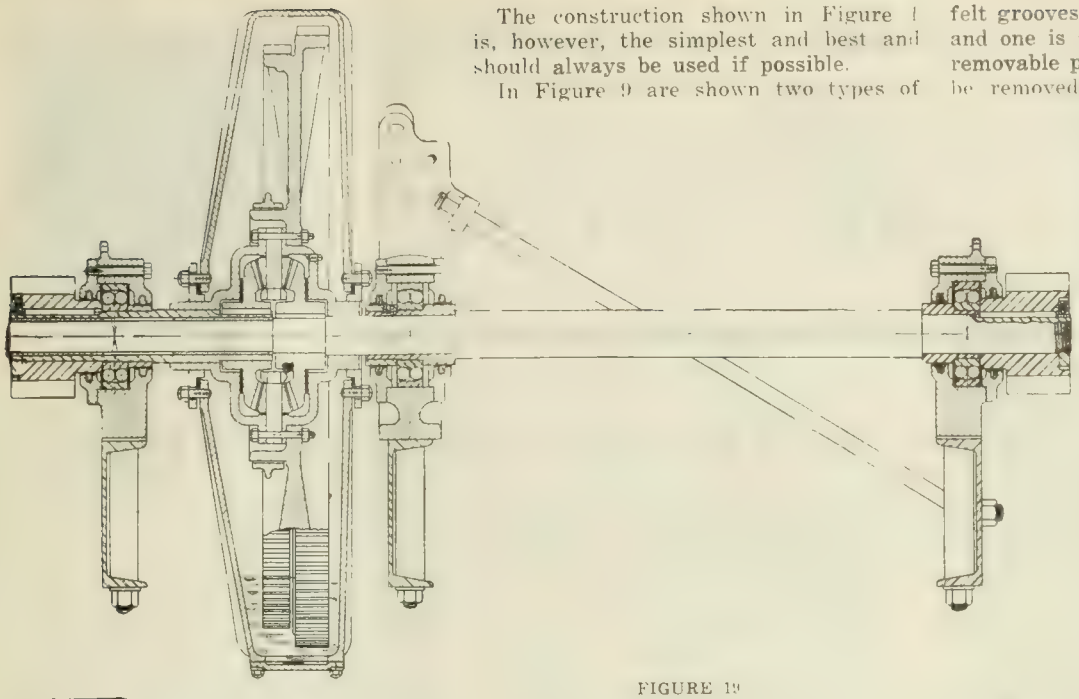


FIGURE 10

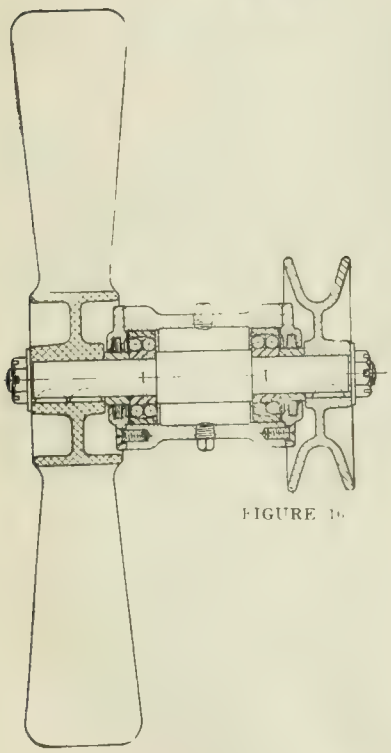


FIGURE 11

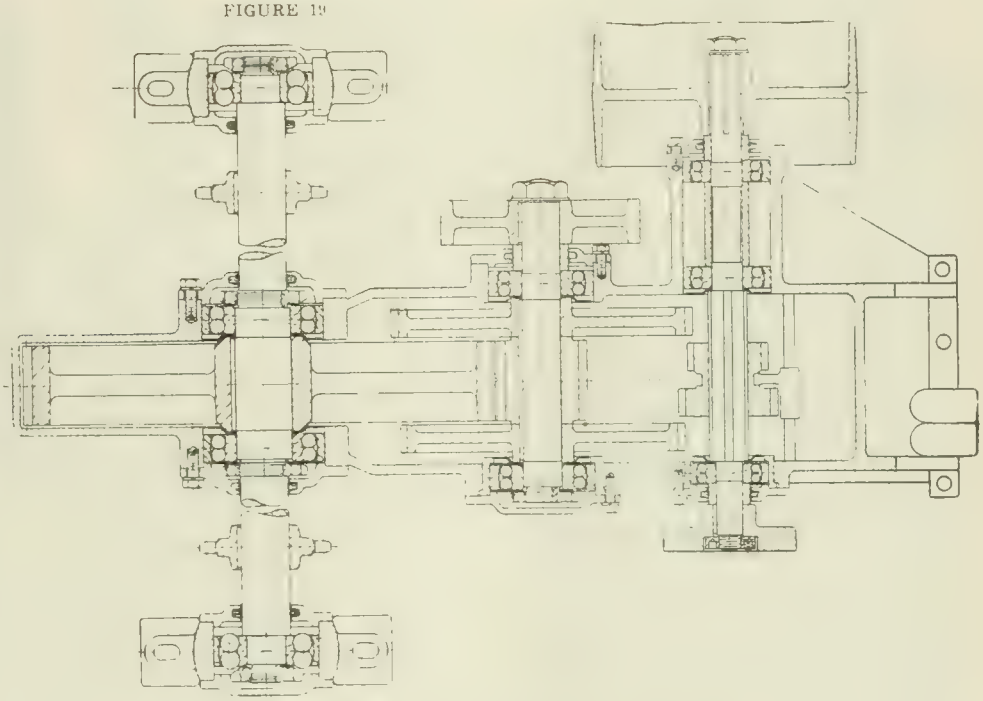
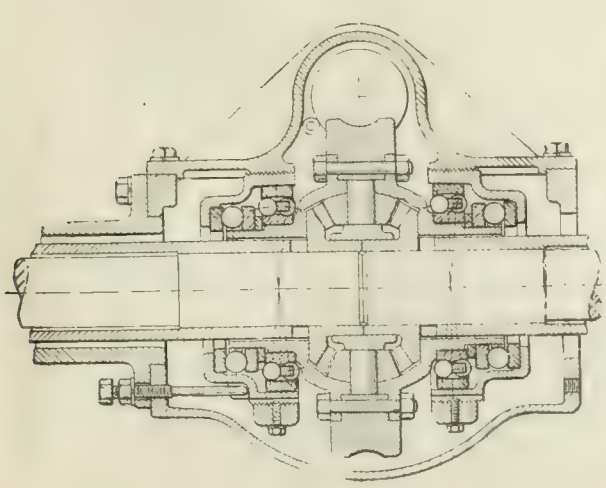


FIGURE 12



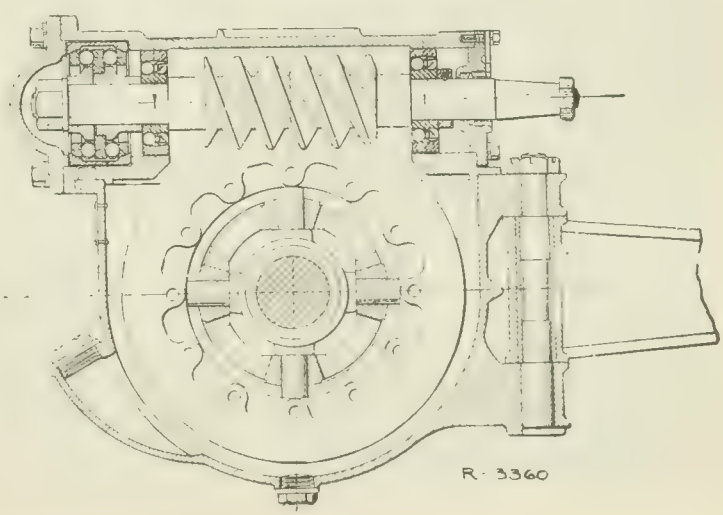


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FIGURE 13

WELDING AND CUTTING

How to Choose an Oxy-Acetylene Blowpipe

The Proper Choice of Blowpipes is Not a Matter of Guess-work But Depends Upon the Character of the Work to be Done and Upon the Equipment on Hand

By C. ROYER, Consulting Welding Engineer

THE individual superintendent, purchasing agent or welder, when he has to buy an oxy-acetylene blowpipe (also called torch) is mostly influenced by the outside appearance of the different makes offered, by the demonstration, and also by the talk of the salesman.

Generally any blowpipe in demonstration will work well, especially if the demonstrator is experienced in the tricks of the trade. In fact we are reminded of a demonstrator who a few years ago was selling welding plants consisting of two fine adjustment valves without spring or diaphragm and of a very rudimentary blowpipe and who could make with such a plant a very satisfactory demonstration, but as soon as the outfit was sold and a regular welder put on the job, the blowpipe would back fire, spit, get extinguished, in fact the plant was useless and after several attempts had to be scrapped, giving a "black eye" to the oxy-acetylene process.

Nowadays few plants are sold as bad as that, but there are many differences in design and construction, and it is well to study the various characteristics so as to be able to make a choice after knowing what is what.

Generally the choice of blowpipe is left to the welder, and we are sorry to say that outside of a few exceptions the majority of welders are not always the best judges of the requisites of a blowpipe. They are much influenced by the outward appearance of the torch, by the finish, and often by a partiality to the make of a blowpipe which they are accustomed to use.

Before studying the points which should be taken into consideration in buying blowpipe, it might be well to give a general outline of them.

The oxy-acetylene torch is a delicate instrument in which the quantities of oxygen and acetylene should be mixed in the right proportion and should burn at the nozzle giving a stable flame which can be used for welding purposes.

This definition presupposes that a supply of oxygen and of acetylene is at hand. Oxygen is generally bought in the trade in a compressed form (1,800 to 2,200 lbs. per square in.) in seamless cylinders, and a pressure reducing valve is employed to reduce the tank pressure to the working pressure required.

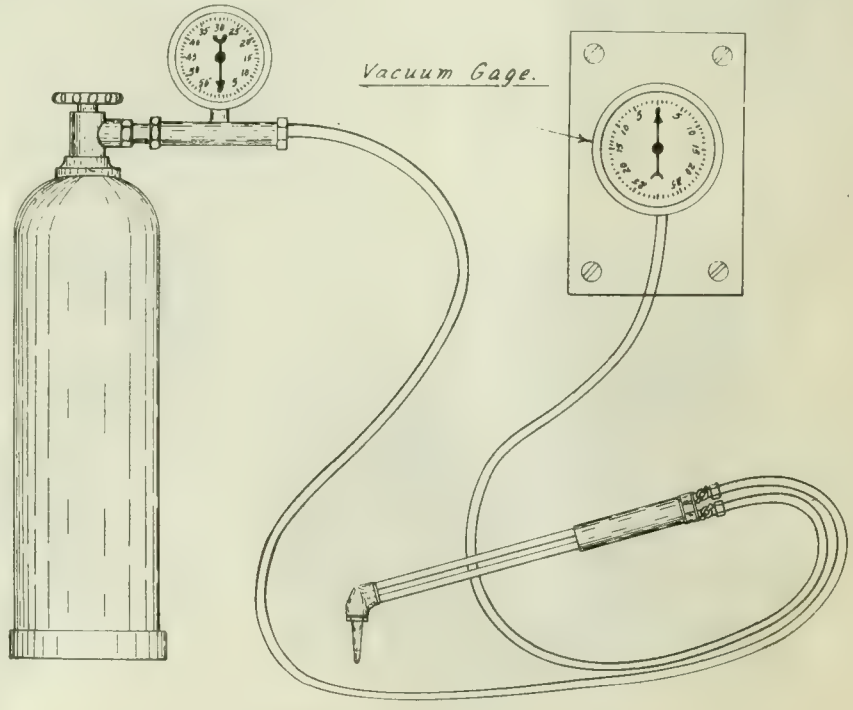
The acetylene can be bought in the trade in tanks where the acetylene is stored under 150 to 250 lbs. pressure and a reducing valve is required to bring the tank pressure to working pressure.

Acetylene may also be made on the premises by acetylene generators which generally work automatically, giving practically a constant pressure, either 6 to 12 inches of water pressure in low pressure generators or 6 to 15 lbs. in high pressure generators.

Blowpipes have two inlets which are connected to rubber tubings, one leading to the oxygen supply and the other to the acetylene supply.

The two gases which are mixed in the blowpipe should have a sufficient velocity at the nozzle so there will be no chance for the flame travelling back inside the blowpipe, which when it occurs is called backfiring or flashback.

The speed of propagation of the flame in the case of a mixture of oxygen and acetylene varies according to the proportion of the two gases, but it is generally admitted to be around 330 feet per second, consequently the velocity of the mixture at the nozzle should be above that figure to avoid the flashback. On the other hand, if too high a speed is used, we will have a very hard flame



METHOD OF TESTING BLOW PIPE

which will stir the molten metal and will have a tendency to blow it away, a condition which should be avoided.

The intimate mixture in the right proportion of the two gases, and the avoidance of flashback, are very important considerations which require serious study. The construction and ease of manipulation are other problems to be considered.

In the choice of a blowpipe the following points should be investigated: type of the blowpipe, power, design, reliability, efficiency, first cost.

Type of Blowpipes

Blowpipes can be divided into two general types. The pressure blowpipe requiring a medium pressure of acetylene supply varying between 1 and 15 lbs., and the low pressure blowpipe—also called injector blowpipe—which can work on acetylene of 4 to 10 inch water pressure, that is to say less than half pound.

The choice between these two types depends on the acetylene supply available. If the prospective buyer has already a low pressure generator, that is to say, producing acetylene under half pound pressure, generally with a gasholder, his only choice will be between the different makes of injector torches, unless he may be enticed to change his low pressure generator to a high pressure one.

In all the other cases the prospective buyer can choose either type of injector torch or of pressure torch and we hope that the present article will help him to select the best torch for his own particular interests.

Injector Torch

The low pressure blowpipe is characterized by a powerful injector actuated by oxygen pressure to draw the low pressure acetylene required to mix the two gases together and give to the mixture a sufficient velocity to enable it to burn at the tip without backfiring.

In such an injector torch, the oxygen has to be used at a rather high pressure, depending upon the efficiency of the injector and the size of the flame, and that pressure varies from 15 to 60 lbs. to the square inch.

The injector torch is generally used in Europe, where restrictions of the authorities do not permit the use of acetylene generators producing acetylene up to a pressure of 15 lbs. per square inch, as is permitted in North America. There the generators in use are generally producing acetylene gas under 6 to 12 inch water pressure, and consequently the use of injector torch is imperative.

In North America only a few manufacturers are constructing the injector type of torch, as there is a general tendency to instal system where acetylene is either generated in a medium pressure generator, that is to say up to 15 lbs., or to use acetylene dissolved in acetone in portable tanks.

The medium pressure acetylene supply has many advantages over the low pressure type, and the writer has not met any welders, who have worked with both systems, who do not prefer the high pressure one; and further in the writer's opinion, it is a paying proposition to replace the one by the other for the reasons which will be explained later on.

However, we have shown that with low pressure generator, the choice of a blowpipe is restricted to the so-called type of injector or torch.

On the other hand, the injector torch can be used on high pressure system of acetylene supply; many are used and seem to give satisfaction to the users. In such cases however, this application seems to be illogical and not economical, as the acetylene pressure has to be throttled down at the blowpipe, and high pressure oxygen has to be used to raise it up again by the use of the injector. Moreover, the majority of the devices which they contain become absolutely useless.

Injector torches are very delicate instruments, of which the injector is the most important part. Should the injector get dirty, or the mixing chamber get lined with soot, the working of the blowpipe is affected. The construction and design of an injector torch should be undertaken only by specialists and technical men, and not by ordinary brass finishers, as the least change in the construction may impair considerably its working and efficiency.

High Pressure Torches

The high pressure torches using more equal pressure of oxygen and acetylene have no injector, or if so, only of a rudimentary character, and all the conditions liable to affect considerably the working of a highly efficient injector, have less influence, and also the construction is simpler and less delicate.

Power of a Torch

The power of a torch is determined by the quantity of acetylene it consumes per hour; a small torch may burn only one cubic foot per hour, while the largest torch made will burn up to 160 cubic feet per hour. In the choice of the size of a blowpipe care should be taken that it corresponds to the work to be done. For small welding only it would not be satisfactory to use a large and heavy torch, and vice versa.

Generally manufacturers make three sizes of blowpipes, each with interchangeable tips, one for light work only, one of medium size for every day work that should burn up to 90 or 100 cu. ft. per hour, and one for large welding only, ranging from 60 to 160 cu. ft. per hour.

It should be ascertained in comparing different makes that the torch to be chosen covers a sufficient range of work, as it may be found afterwards that instead of one size of torch required, two will be needed to do the work on hand.

Manufacturers, as a rule, use an arbitrary number on their tips, which do not correspond to those on the different makes, and it will be well to ascertain from the manufacturer the burning capacity of the different tips in cu. ft. of acetylene per hour.

It is generally admitted that on plate work a tip of a burning capacity of 4½ to 5½ cu. ft. per hour, per 1-16 in. of thickness, should be required; for instance, to weld ½ inch plate would require a tip burning from 35 to 45 cu. ft. per hour.

On round or square pieces the consumption of the tip suitable should be from one-third or half the above figure.

As a rule welders can judge pretty accurately the power of the tip by only looking at the size of the drilled hole.

Design of Blowpipe

In both injector and pressure torches some manufacturers have adopted a very long mixing chamber starting from the handle to the tip, contending that it is necessary for getting a good mixture of the two gases.

On the other hand some manufacturers claim that the mixing of the gases should take place in the tip, as it is the only way of getting the right size of passage for the different size of flame, while with a long mixing chamber the diameter of the passage cannot be suitable for the different sizes of flame unless the mixing chamber is changed with every two or three sizes of tips.

The manufacturers mixing the gases in the tips are more numerous, and their blowpipes have a larger range, and the same time are less exposed to backfiring than blowpipes with the use of only one long mixing chamber for the different sizes of tips.

It is a fact that the length of the mixing chamber should be sufficient to insure a thorough mixture, but practice shows that sufficient length can be obtained in using long tips for large size flames, when the mixing takes place in the tips.

The design of the method of joining the tips to the head is very important. In most of the torches the tips are threaded on the head; this method has many disadvantages, as after a little use the threads get loose by being subjected to a very high heat and they will leak, which is a cause of backfiring.

Some torches have the joint removed further from the heat and do not have this fault.

When threads are used on the tips they should be male, as the expansion of the tip is greater than the expansion of the tip holder, while on the contrary, when the threads are female on the tip, the expansion tends to loosen the joints.

One of the best designs is the threadless tip which has a cone seat with a rather broad angle so as to avoid sticking or cracking the head when tightening the nut making the joint.

Attention should be given to the oxygen and acetylene inlet valves, which should be easy to manipulate and should not leak. The design of a single valve operating both the oxygen and acetylene supply is not to be recommended, as it is very hard to keep it in good order, and when starting to leak it is almost impossible to repair it and it becomes dangerous for the welder.

Much attention should be given to the metal in the tips. It should not be made of brass or soft metal, as they will melt easily, thus increasing the cost of main-

tenance. The tips should be made of copper or an alloy of the same high melting point, and no torch should be bought having soft melting tips.

Reliability From Backfiring

We should call reliability the quality of a torch to keep on giving good service without interruption of the welding operation, that is to say, without requiring constant readjustment of the flame and without constant backfiring.

Backfiring is the burning inside of the torch, of the mixture of the two gases, which requires the immediate closing of the supply of oxygen and acetylene, as if it is prolonged unduly the blowpipe is liable to be permanently injured.

Backfiring is the bugaboo of welders. When it takes place the welder has to stop welding, to cool the torch in water, to re-light and readjust it, and reheat the place to be welded before he can start welding again, thus wasting much valuable time, and especially the costly gases required to bring back the job to the required temperature.

Backfiring may be due to many causes; if at any time the speed of the gases escaping from the tip becomes lower than the speed of the flame propagation of the mixture, the flame will travel back inside the blowpipes and will cause backfire.

A hot job, welding in a corner which produces resistance to the escape of the gases issuing from the tip, may produce this condition.

In a general way backfiring is more prevalent in a low pressure acetylene system than where acetylene is used under higher pressure. In such case, a leak in the acetylene line or the blowpipe, permitting air to be drawn inside the torch by the vacuum created by the injector will cause a backfiring which is very annoying and even dangerous.

Speed of The Flame

The speed propagation of the flame of a mixture of oxygen and acetylene gases is dependent on the proportion of the two gases. A lean mixture, one containing a small proportion of acetylene, will have a flame travelling faster than a neutral mixture. This can be explained by comparing same to the carburetor of an automobile engine. Everybody is familiar with the fact that a lean mixture will burn inside the carburetor under some conditions, whereas a very rich mixture will pass through the exhaust manifold into the muffler before exploding.

In the blowpipe, any excess of oxygen will have a tendency to increase the speed of flame propagation and consequently the backfiring, and can be counterbalanced only by a terrific speed of the mixture escaping from the tip.

When a blowpipe is lighted and regulated and used in a corner a resistance is offered to the flow of the burned gases. This introduces a back pressure which checks the speed of the gases inside the blowpipe and checks mostly the gas which is under the lowest pressure. As in most blowpipes the oxygen is under a pressure superior to the acetylene, under such conditions the proportion of the oxygen in the flame will increase and so will the tendency to backfiring, due to that cause and also to the fact that the speed of the mixture escaping from the tip has been reduced.

When a blowpipe starts backfiring, it is generally the practice of experienced welders to give more pressure to their blowpipe by opening slightly the oxygen and acetylene valves or by putting more pressure on their regulators, so as to balance the introduced resistance. In low pressure acetylene system this action will have the effect of increasing the proportion of oxygen in the flame and to give an oxidizing flame. In torches using medium acetylene pressure, the increase of oxygen in the flame will be less, and should the torch use equal pressure of both gases, the effect should be nil.

Though these explanations may seem unimportant to the lay mind it will show that a low pressure acetylene system is more liable to backfiring and that under certain conditions the oxygen proportion of the flame will automatically increase.

A certain authority claims that the excess of oxygen in the flame is the only cause of backfiring and by suppressing it, and keeping the velocity of the escaping gases above the minimum limit, no backfire should occur.

To the practical operator the backfiring is the greatest waster of time and of gas, so to him the ideal torch is the one which will not backfire under normal conditions.

The prospective buyer of a torch should pay much attention to the non-backfiring features of the torches offered to him, and should ascertain the facts, and also that the torches do not reduce the backfiring by using too strong pressure of gases, which would give too hard a flame for good work as it would blow the fused metal away.

Efficiency of Torches

Each manufacturer of torches claims that his torches are efficient, but very few substantiate their statement by giving figures of consumption.

We will try to explain what may be called the efficiency of a blowpipe.

One cubic foot of acetylene requires 2½ cu. ft. of oxygen to produce complete combustion. In the oxy-acetylene blowpipe, the combustion is made in two stages. In the first stage acetylene should combine with oxygen volume per volume, to produce carbon monoxide and free hydrogen, in the second stage these gases should combine with oxygen to produce carbon dioxide and water vapor.

The oxygen necessary for the first stage should be supplied from the cylinder of oxygen, while the oxygen necessary for the second stage should be supplied by the atmosphere, and is equal to 1½ times the volume of acetylene.

Consequently, according to theory, for one cubic foot of acetylene burned, one cubic foot of oxygen should be supplied from the cylinder (which costs money) and 1½ cu. ft. from the atmosphere (which costs nothing).

In practice it is found that with the majority of blowpipes the quantity of oxygen used is more than it should be, and the nearer this ratio is obtained, the more efficient the torch will be.

The efficiency of a blowpipe can be expressed as the ratio in cu. ft. of the acetylene used to the oxygen multiplied by 100.

For example, if a torch burns 100 cu. ft. of acetylene per hour it should use, according to theory, 100 cu. ft. of oxygen and the efficiency should be $\frac{100}{100} \times 100$, equals 100 per cent.

In practice this efficiency is seldom obtained and it is generally admitted that 125 cu. ft. of oxygen is required for 100 cu. ft. of acetylene; in such cases the efficiency is $\frac{100}{125} \times 100$, equals 80 per cent.

The efficiency of a blowpipe is mostly dependent on its design.

With injector torches, it is found that the efficiency varies from 55 per cent. to 83.3 per cent., depending on the design of the injector, the pressure used, etc. The injector of such a blowpipe is a very delicate part; if it becomes partially clogged, or if the mixing chamber is covered with a deposit of soot, the efficiency of the torch will vary.

The efficiency of an injector depends largely on the design of the cone in front of the injector, and also how it is centered; the slightest deviation from the axle of the cone will reduce considerably the suction action.

Testing the Torch Action

It is very important to be able to verify the action of the injector of a blowpipe, and it is easily done by connecting the oxygen inlet with the oxygen supply, and the acetylene inlet with a vacuum gauge by means of a stiff rubber tubing. The oxygen supply is opened the same as on working conditions. The suction of the injector should create a vacuum on the gauge from 7½ to 10 lbs. below atmospheric pressure. In varying the oxygen pressure, the variation on the vacuum gauge will show the best working pressure.

It is known that a given injector blowpipe in the hand of an experienced welder may give an efficiency of 83 per cent., while in the hands of another only 55 per cent. This difference is accounted for by the fact that one was using a low pressure of oxygen while the other a too high pressure.

To sum up, we may say that in injector torches, the efficiency depends on the design, on the state of the blowpipe, and on the skill of the welder. In the best designed injector torches the efficiency is never more than 85 per cent., while in actual practice it is nearer 70 per cent. than otherwise.

It is apparent even to the lay mind that a torch using oxygen under high pressure and acetylene under low pressure, is bound to use more oxygen than a torch where the two gases are under almost an equal pressure, and the greater the difference between the pressure of the two gases the less the efficiency is liable to be.

By the above it can be ascertained that the efficiency of a blowpipe has a

very important bearing on the cost of welding. In the inefficient blowpipe some oxygen which costs money is wasted through the flame, while it should be supplied by the atmosphere.

If we take for instance a blowpipe using 100 cu. ft. of acetylene per hour, if this blowpipe is efficient it will use only 100 cu. ft. of oxygen per hour, while in another blowpipe of the same power having only 80 per cent. efficiency the oxygen used will be 125 cu. ft., and the excess of oxygen used 25 cu. ft. per hour at 2c per cu. ft., will cost 50c per hour; for six hours per day, $3.00; and for 25 days per month $75.00, that is to say more than the value of a blowpipe.

This example is for rather a large tip, but the same ratio holds good for smaller or larger consumption. In the above example we have taken the efficiency of a good blowpipe but should the efficiency be only 55 per cent. the amount of money wasted will be much larger.

Another advantage of an efficient blowpipe is that the less the excess of oxygen in the flame, the more neutral the flame will be, and the better chance the welder has to make a good weld.

If the prospective buyer has to rely on the statement of a salesman to know the efficiency of a blowpipe, he may be sure that any torch offered to him is the most efficient one on the market.

A simple way to test out the efficiency is to weigh each cylinder of oxygen and acteylene to be used in the test before and after using the blowpipe for a certain length of time. An hour's use should be sufficient for a large tip and several hours for a small tip. The decrease of weight in pounds of the oxygen cylinders used multiplied by 11.20 will give the number of cubic feet of oxygen used.

For acetylene the decreases in weight of the corresponding cylinders multiplied by 13.65 will give the number of cubic feet used.

The number of cubic feet obtained for the acetylene consumption multiplied by 100 and divided by the number of cubic feet of oxygen will give the efficiency of the blowpipe tested.

Such test can be carried on during actual welding and will show the efficiency under working conditions.

In low pressure systems of acetylene supply, test cannot be made in using the generator unless a meter is available, which is not ordinarily the case. It is possible in such circumstances to procure some acetylene cylinders for testing purposes and the acetylene pressure regulator can be set so as to obtain the pressure given the generator. Should the regulator be set for a higher pressure the test will not give the efficiency of the blowpipe under ordinary working condition, but will give a higher efficiency as it has been shown that the less the difference in pressure between two gases, the higher the efficiency will be.

Logical conclusions would indicate that the best efficiency should be obtained by blowpipes, using almost equal pressure of both gases, if the torches are well designed.

A well known make of blowpipe using acetylene under 6 lbs. pressure is claimed to have an efficiency of 87.6 per cent., that is to say uses 1.14 cu. ft. of oxygen for 1 cu. ft. of acetylene.

A new torch which has been lately put on the market is claimed to show 100 per cent. efficiency due to a new principle used in designing this blowpipe. A slightly higher pressure of acetylene than oxygen is used, though not above 10 to 12 lbs. of acetylene for the largest tip. It is claimed that by the application of this new principle, the backfiring is also completely eliminated. If this claim is substantiated the economy realized would be very great, as it has been shown in the above example..

First Cost of a Blowpipe

It is hoped that it has been shown that the efficiency which is generally a neglected factor in the choice of a blowpipe should be almost the deciding factor, specially as a better efficiency decreases the chances of backfiring and increases the quality of the welding flame and permits the making of better welds, almost free from oxides.

It has been shown also that the injector torch, which is most valuable in Europe where they cannot use high pressure generators, is not the logical torch to use in North America to obtain the best results. The low efficiency of the injector type of torch, its delicate construction and the fact of it requiring a better class of welder, are the chief reasons for the more general use of the high pressure blowpipe.

It is hoped also that it has been shown that to the writer's point of view the changing of low pressure acetylene system to medium pressure system should be a paying proposition, though the first cost might appear uncalled for. Any firm doing quite a quantity of welding would quickly save the first cost by reduction of their oxygen consumption and would obtain a better class of welding by obtaining a less oxidizing flame.

After these explanations, which could be much extended, the writer hopes to have shown the characteristics which should be looked for in the choice of a blowpipe and hopes that the reader will come to the conclusion that the first cost should be the last consideration and that service and efficiency are the most important factors.

BALL BEARINGS IN TRACTOR DESIGN

Continued from page 183

standard ball bearing for use on tractor clutches.

It is evident that when a rigid bearing is used in the clutch even slight misalignment will cause the bearing to bind and ultimately fail. The self-aligning ball bearing—due to its special design—compensates for such misalignment and operates without binding at angles that would destroy any other bearing.

Figure 15 shows a tractor drive-wheel mounted on ball bearings. Note the clean-cut, simple mounting. Also note the extremely large lubricant space; such a reservoir will hold enough lubricant for months of service. The housing used here is both dustproof and oiltight.

Figure 16 shows a typical fan mounted on ball bearings, which eliminates all lubrication troubles. Note the large oil chamber, which holds enough lubricant for months of service.

The bull pinion of a tractor is the place where ball bearings are most needed. At the bull pinion the loads are heaviest.

The ball bearing is the most efficient bearing made. It wastes less power than any other type of bearing. The ball bearing is also the best load carrier. To carry a given load the ball bearing can be shorter than any other.

Figure 18 is a tractor worm-drive, showing ball bearings used and the method of mounting and housing them. Note the self-contained, self-aligning double thrust bearing which takes thrust in either direction. This bearing is exceedingly simple to mount, since very little machining is necessary.

The worm-wheel is mounted on two radial bearings and the two single thrust bearings take care of all thrust loads. Figure 19 shows a ball bearing equipped transmission designed for one of the leading tractor builders. Simple design, compact construction and easy assembly are some of its features.

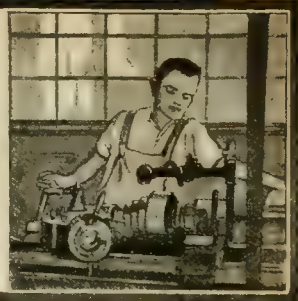
Figure 20 is a phantom view of the worm drive of the Sandusky Tractor, manufactured by the Dauch Manufacturing Company, showing the radial and thrust ball bearings.

Figure 21 is a similar view of a Cotta transmission, which is being used in a large number of tractors.

The application of the brinell ball test to the measurement of the hardness of ceramic products has hitherto been hindered by the irregularity of the impression produced. This difficulty has been overcome, according to MM. H. le Chatelier and B. Bogitch in "Comptes Rendus," by placing upon the sample a piece of foil 1-20 mm thick and 30 mm. square which has been blackened with sulphuretted hydrogen. The impression of the ball is very clearly left on the foil and can be accurately measured. The ball used was 17.5 mm. in diameter under a pressure of 500 kilos. left on for one minute.

Washington.—Ocean freight rates for general cargo moving from Pacific ports to Japan and China have been fixed at $12 per short ton by the United States Shipping Board from March 1st. This makes a reduction since January 1st of $56 per short ton. The rates to Vladivostok were announced at $25 per short ton. General cargo rates to English ports from American South Atlantic ports were fixed at $1.07½ per hundred pounds, and increasing in other directions to a maximum of $1.93 per hundred pounds for cargo to Barcelona.

WHAT OUR READERS THINK AND DO



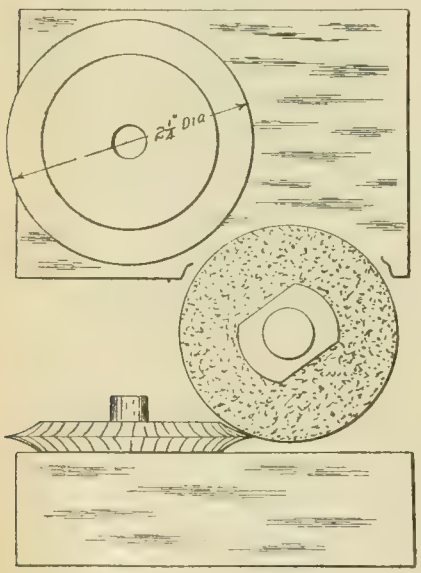
Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

SHARPENING SLITTERS ON A CUTTER GRINDER

By D. A. H.

PAPER working machinery, such as found in newspaper offices, printing and publishing establishments generally, and paper box and novelty factories, is frequently supplied with some means of cutting the paper or heavier stock that is handled. This may be the regular knife of the paper cutter, dies, shear blades, slitters, or perforators. The straight blades are regularly sharpened in knife grinding machines, or they may be sharpened tolerably well in any machine shop by hand-grinding on the shop tool grinders.

One type of cutter is the slitting wheel, shown in the drawing. This is extensively used in newspaper folders for trimming off the fold and for cutting the various facings used in paper boxes. On all of this work the machines are automatic and the paper drawn under the wheel, which is thus given the motion that causes it to roll and cut at the same



SHARPENING A SLITTING KNIFE

time. The size given is a fair average: the wheel is very hard and is shaped to an almost razor thinness, this edge cutting against copper or wood.

One machine shop sharpens a great many of these slitters, but does not do it on a cylindrical grinder, as would be supposed, because it has none. They do have a Garvin cutter grinder, and this is used very successfully, as shown in the drawing. A block of cast iron that is clamped to the table forms the base. In it is the centre plug, which is a close running fit in the slitter hole. The latter is placed in position and the table raised until the emery wheel contacts with the slitter, but very slightly. The slitter is revolved by the fingers—a very easy process, for the cut is necessarily light. Further cuts bring one edge down to form and then the wheel is turned over and the other side dressed. This makes a good job, and a quicker one than if done on an arbor in a cylindrical grinder—in fact, is a little better as the work is located from its face and from the hole with no chance of an inaccurate arbor spoiling the job. A smoothing down with an India oil stone produces an edge that will cut the thinnest paper.

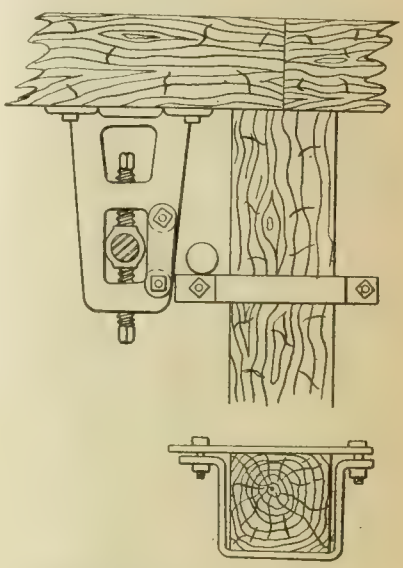
Other round knives are sharpened in a similar manner. Face slitters, which run in pairs like those used by tinners, and which are sharpened on the periphery, are ground with simple fixtures. This job requires the cutter to be turned at right angles to the one in the drawing. The table stops are, of course, set to prevent digging in. The same Norton wheels used for cutter grinding are employed.

INSTALLING BALL BEARINGS IN SHAFT HANGERS

By DONALD A. HAMPSON

Our line shafting in the machine shop was carried by thirty-seven Dodge hangers with plain babbitted bearings. After considering the change to some form of anti-friction bearing, an order was placed for a well-known make of ball bearing, which was to be installed with the written guarantee of saving its cost in power in two years. There was to be no charge for putting the bearings in, except that we were to furnish the labor, while the bearing company sent its own man to direct the work and see that everything was properly done.

The representative—salesman and engineer, he was—asked for four men to do the work, stating after he had looked over the layout that it could all be done on a Sunday. The Sunday was appointed some time after the bearings had arrived, and the bearing company was notified that we would give them the Saturday afternoon preceding as a few



INSTALLING BALL BEARINGS IN SHAFT HANGERS

hours of grace to provide for contingencies. Also, we provided six men instead of four. Well, the Saturday afternoon arrived and so did the representative, and we went home to rest with the comfortable feeling that an awkward job was placed in safe and capable hands, and we could come around Monday morning to see the shafting running away from itself on the new bearings.

Imagine our surprise on arriving Monday morning to find no representative, no shafting running, no men at work, and belts, dirt, pulleys, and confusion everywhere. The six who had worked Sunday had struggled manfully and were tired out. By putting the whole gang on the job we managed to get the section back together, belts and pulley on, and shaft running by eleven o'clock. Fifteen hangers were equipped with the new bearings,—but by six men in two days—quite a difference from the expert's estimate. Later in the week we heard from the representative that he was occupied

for the next four Sundays, but would return after that to clean up the job, or, if we chose to pay another millwright for supervising the work, his company would pay the charge.

To put in the new bearings it was necessary to uncouple the shaft lengths, take the lengths out of the hangers, and strip the shafts of pulleys up to the journals. The company man had gone at this very heroically—had lifted the lengths out of the hangers and lowered them to the floor, then set as many to stripping of pulleys as could be worked on the piece. The pulleys were Dodge wood split, and he had the finest array of bolts and nuts, unattached, that one could wish to see. The representative had been furnished with all that he had asked for in the way of apparatus.

We decided that we would finish the job ourselves on the following Sunday, doing it the best we could in our ignorance and inexperience. The building construction is as shown by Fig. 1. The hangers were bolted to beams and lined up about a foot from 8 in. x 8 in. posts, or columns, that supported the beams Dodge hangers of the type shown have a pair of links spanning an opening in one side, the opening permitting removal of the bearings at the side. In the original erecting, the open side of the hangers had been set toward the posts The layout seemed just made for easy changes, and we planned accordingly.

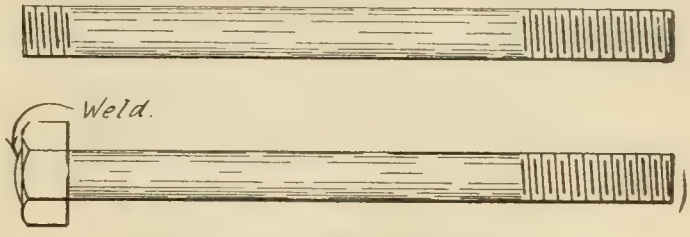
Three clamps of ½ in. x 2 in. iron were made up to encircle the posts in the manner shown by Fig. 2. These were to be fastened in the position shown in Fig. 1 with their upper surface on a level with the opening in the hanger, and with one end within half an inch of the hanger. Our intention was to roll the shaft right out on this "floor," instead of taking it twelve feet down. With 2 7-16 in. shaft, the avoidance of this lift is a time and labor saver.

It was all extremely simple and easy, and we put through the installation of twenty-two bearings in the one day and with the gang of six. Each length of shaft was considered on the day previous and the work planned so that the fewest number of pulleys would have to be disturbed. Each length was sketched on paper, and the position of those pulleys put down, so that they could be reassembled without guesswork. The pulleys were removed before the shaft was shifted, which saved labor. The three clamps were sufficient for each length of shaft and more were not required, as the entire gang on a length made short work of it. The time saved and the risk avoided by not lowering the lengths is a big item, and a similar method could be applied to many of the installations on shafting that is already in place.

AN EFFICIENT BOLT

By G. D. McCarrell

It is often desirable to make a small bolt when the necessary size of stock is not available. A convenient method of accomplishing this, and one that is very efficient, is shown in the accompanying sketch. Obtain a piece of round stock of the required size of bolt and thread each end as shown, the short end to take a standard nut and the long thread made to suit the desired conditions. When the nut that serves for the head has been screwed on the end is welded with an oxy-acetylene torch, the result being a very satisfactory bolt.



METHOD OF MAKING EMERGENCY BOLT

BOOK REVIEW

"Mechanical Drawing," by Ervin Kenison and Edward D. Waite, the American Technical Society, Chicago

The work of the accomplished engineer or designing draftsman is something which demands broad acquaintance with engineering and necessitates considerable ability and inventive skill. The same men who show such skill have had to acquire it through careful and painstaking study and practice of the rudiments of mechanical drawing. They had first to lay their foundation for the more advanced work along this line of equipment necessary for drawing of various kinds and how to use it. All of these important features are carefully treated of in this work. The studies are illustrated by diagrams and plates, and describe for students the simplest drawing problems to those which in difficulty approach more on the architectural and engineering fields. A portion of the book is given over to the description of necessary tools and their proper use. The method of the actual making of mechanical drawings is taken up in detail. In this part of the book much attention is given to geometrical definitions and constructions, as it is recognized that they are the foundation for much engineering work which finds its way to the drafting board. Altogether this book should prove to be a welcome aid to those who are beginning the study of engineering or architectural drafting.

Orders Are Wanted.—It is feared by the lumber interests that if additional orders are not secured in the immediate future the lumber mills of British Columbia will have to close down. They say that the British timber controller is calling for tenders from American brokers on the Pacific Coast. The Premier of British Columbia has wired to Sir Thomas White, urging him to take some action to prevent this state of affairs.

Do You Know That

The proper blank dimension for cup work on stamping and drawing presses is determined either by multiplying the circumference of the shell by its height, adding the area of the bottom, and then determining the diameter of a circle of equal area, or by cutting out a blank and reducing its diameter until it weighs the same as the article desired.

In the early days of the oil-immersed transformer, attempts were made to use some of the fixed oils, such as resin oil, linseed oil, cotton-seed oil; because it was found that these oils had a higher dielectric strength than the straight oils at that time on the market. It was soon found, however, says Mr. W. S Flight, in the "Electrician," that the fixed oils gave trouble in the transformers due to the formation of carbonaceous deposits, and about the same time it was found that straight oils, free from impurities and all traces of moisture, had as high dielectric strength as the fixed oils. As the latter are not so liable to form deposits and are cheaper, their use has continued ever since. It has been found that the voltage at which a definite thickness of oil will break down depends more upon the amount of moisture and other impurities in the oil than upon the type or nature of the oil. When tests are carried out on clean moisture-free oils it is found that those having a low viscosity have a higher dielectric strength than those of higher viscosity.

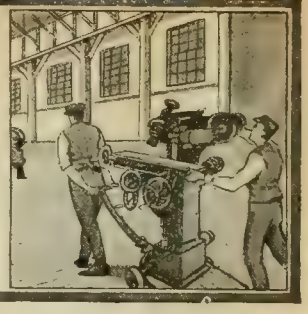
THE THOUSANDTH OF AN INCH

J. N. R.

At night I sit and ponder
On the thousandth of an inch;
I knit my brow, and scratch my head,
And then my fists I clinch.
O, show to me the man, says I—
If Irish, Dutch, or Frinch—
The man who first invented
The thousandth of an inch.

When finally I crawl in bed,
So thankful for a snooze,
I drive my sorrows all away
Without the aid of booze—
I dream that they have caught the man,
And him they now will lynch,
By jinks! The man who did invent
The thousandth of an inch.

DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

KEYSEAT MILLING MACHINE

THE new type heavy duty horizontal keyseat milling machine manufactured by the Newton Machine Tool Works, Inc., Philadelphia, U.S.A., is very flexible in control, and has a number of interesting points.

This machine is frequently supplied with a newly designed set of centres with quartering devices for accurately milling on the quarter the keyseats of locomotive axles, and when the special quartering fixtures are used the keyseats in both ends may be finished with the original setting, when desired. The vertical spindle is used to end keyseats when necessary, such as those in the eccentric strap bearings. Another advantage in that it can be mounted on the horizontal spindle to allow milling keyseats in shafts in multiple.

The particular machine shown by the illustrations, was manufactured for keyseating shafts for large rotors.

The general dimensions of the machine are as follows:

Diameter of horizontal spindle in bearing, 4⅝ in.

Diameter of horizontal spindle through driving gear, 4 in.

Side adjustment of horizontal spindle by hand, 4 in.

Distance centre of horizontal spindle to under side of cross rail, 2½ in.

Maximum cutter swing on horizontal spindle, where vertical spindle saddle does not interfere, 10 in.

Maximum cutter swing under vertical spindle saddle, 6 in.

Width of work table over working surface, 20 in.

Length of table to mill, 10 ft.

Width between uprights, 26 in.

Maximum height centre of horizontal spindle to top of work table, 33 in.

Maximum height end of vertical spindle to top of work table, 35 in.

Diameter of vertical spindle, 2 in.

Independent hand vertical elevation to vertical spindle sleeve, 6 in.

Vertical spindle is located so that it can be adjusted to a maximum height of 2 in. above the centre of the horizontal spindle.

The weight of the machine, complete, is 22,000 lbs. when length of table to mill is 10 ft.

A vertical spindle saddle, mounted on the flat cross rail, has a hand cross adjustment on the rail by means of a rack and pinion.

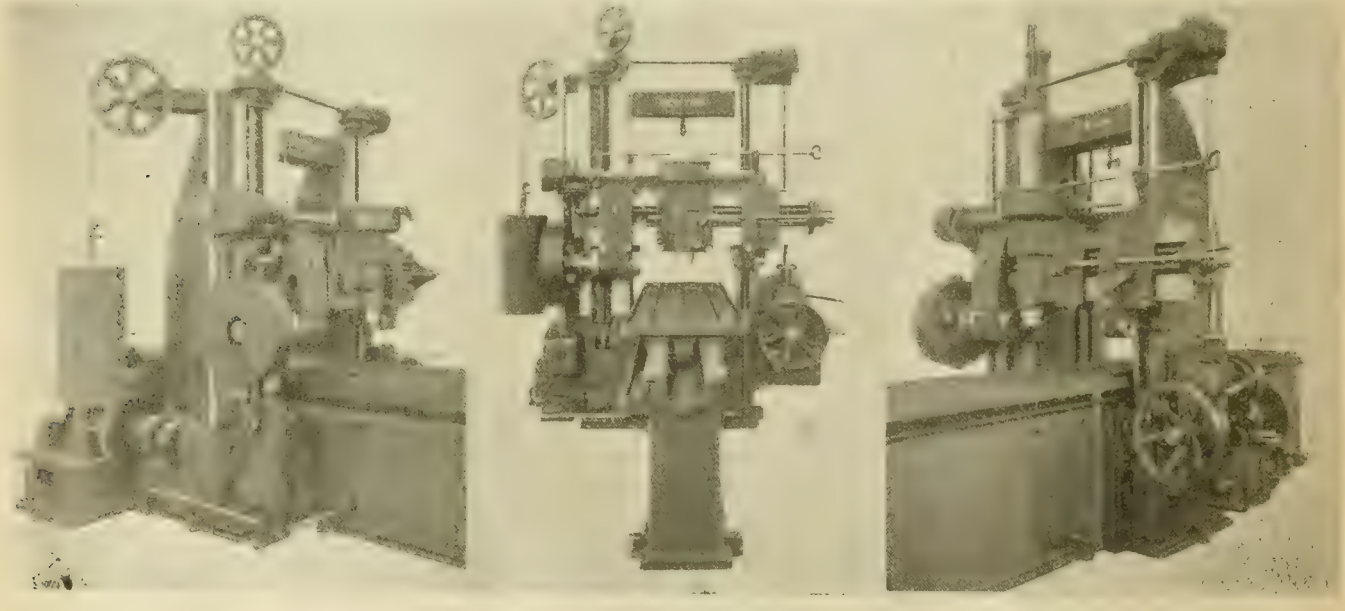
The independent hand vertical adjustment of the vertical spindle sleeve is controlled by a worm and worm wheel connected to the spindle rack pinion, and the control is actuated by a spline shaft carried to the right-hand end of the cross rail as shown.

The horizontal spindle head is also adjustable by hand within its range across the rail by screw controlled from the right-hand side of the cross rail.

The table of the machine has nine changes of gear feed from a box, in which are mounted adjustable sleeves, giving changes without removal of gears. The table also has reversing fast power traverse. The cross rail is counterweighted, and has reversing vertical fast power traverse in addition to hand adjustment.

The shaft transmitting motion for the vertical adjustment of the cross rail is fitted with a micrometer collar for adjusting the cutter on the horizontal spindle to the required depth. The horizontal spindle is driven by a bronze worm wheel and hardened steel worm, fitted with roller thrust bearings. Vertical spindle is driven by a worm wheel and spiral bronze gear, and the drive for both spindles is encased to permit of continuous lubrication.

The horizontal spindle is fitted with a Morse taper, holder, face keyway, and through retaining bolt, as is also the



NEW KEYSEAT MILLING MACHINE

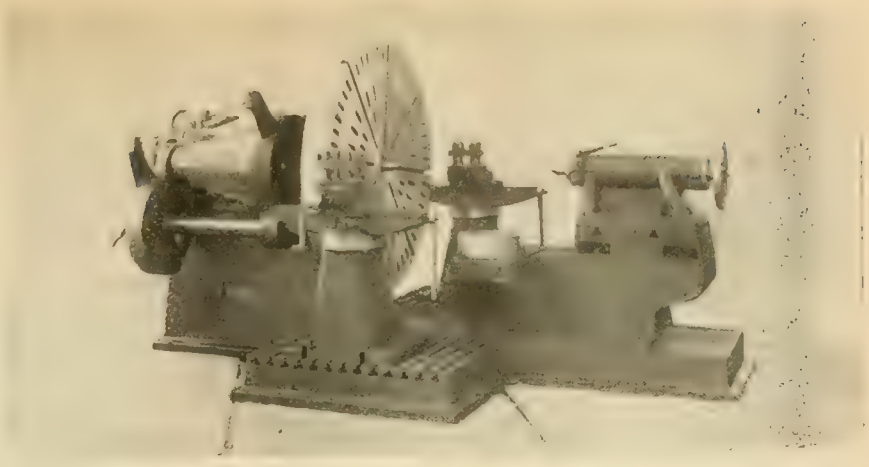
vertical spindle. The vertical spindle is fitted with a No. 4 Morse taper.

The outer support on the cross rail is adjustable on the rail by means of a rack and pinion. The cross rail elevating screws have a top and bottom gearing to insure their operation in tension

The work table has three finished tee slots, drilled stop pin holes at each end and is surrounded by a pan for draining off the lubricant to a tank in the base. It is operated by a spiral pinion and angular rack.

Practically every bearing, except those for the lifting screws, is bushed.

All gears in the driving train are steel or bronze, and in the feed train all gears, except the large substantial spur gear, are steel or bronze.



NEW 72-INCH FACE LATHE

THE FORTIN 5-SPINDLE TURRET DRILL HEAD

The accompanying illustration shows the latest production of the Fortin 5-spindle turret drill head as attached to large size drilling machines.

The constant demand for a small size turret drill head to be used on a large size drilling machine has led to the development of this product. This head is built in various sizes of both styles.

As designed for smaller machines the head clamps directly to the sleeve. This new method of attaching allows the head to be used on drilling machines of any size or make. As shown attached to the larger machine, the driving arbor fits into the spindle of the drilling machine while a separate piece is clamped to the sleeve with an adjustable rod connecting it to the head; this prevents the head from revolving and also from falling out of the spindle in case vibration should loosen it.

These heads operate by pressing the lever in front and revolving the turret either way while the machine is in operation, thus bringing the tool to be used into the working position, the other spindles remaining idle.

These heads have been tried out in many of the largest factories throughout the country with very satisfactory results.

They are manufactured by the Spafford Tool Works, of Hartford, Conn.

FIVE-SPINDLE DRILL HEAD

NEW FACE LATHE

THE Canada Machinery Corporation, Galt, have recently brought out the new 72in. face lathe shown in the accompanying illustration. The lathe has many features which commend it to prospective users. The headstock is long and rigid and is equipped with phosphor bronze bearings. The driving cone has five wide steps and is geared as well as triple geared to the face plate, giving a wide range of speeds combined with great power.

Two pillar rests are supplied. These are arranged to swivel in any direction and are graduated in degrees. The cross slides which are mounted thereon are operated by a ratchet feed through an overhead rock shaft.

The tailstock is adjustable upon the housing, which is also adjustable along the bed. The housing is provided with a wing upon which one of the slide rests may be clamped for turning hubs or small work.

A countershaft is provided with two pairs of fast and loose pulleys, which arrangement gives, in all, twenty spindle speeds. The manufacturers call special attention to the new and original belt shifter, which not only makes easy the shifting of heavy belts but also forms a safety device by preventing injury to the operator. This machine has the following dimensions:

Dia. of face plate	64"
Swing over bed	73"
Swing over sliding bed	37"
Maximum distance between centres	1' 6"
Maximum distance between tool posts	74"
Minimum distance between tool posts	35"
Travel of tool post upon rest	8"
Travel of cross slide upon pedestal	24"
Available travel of tailstock spindle	18"
Ratio of back gearing	7.8:1, 87:1
Floor space	13' 2" x 8' 10"
Weight	16,000 lbs.

Ottawa.—Further study of the shipbuilding cost figures made available by the Marine Dept. show that the cost of building in Canada is still much above that of other countries. The Government's agreement with the Dominion Steel and Iron Co. for ship plate at $85 per ton, compares with plate in the United States at $60 per ton, while the British price is lower than the American

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The Shell Shop Machine

YES, I was a dandy in my day. When the war started I was rushed out, and until the war was finished I was still rushed. Men worked day and night making and shipping me. There was a feverish excitement all through. I heard them say a good many times that I was a single-purpose machine tool. Making shells, or helping to make them, was to be all that I was for. But at that time that was all that mattered. Things were looking black as night in Europe, and I was moulded, machined and rushed to the shippers with a good many rough corners. I never would have passed inspection for my beauty. But for all that I was strong and big and was well able to stand up under all sorts of heavy work.

And so I got a job rough turning big shells, six-inch ones. I held a cutting tool that bit off great rings of steel. And there, for 24 hours a day I stood and held that shell and held on to that tool, and kept on doing that first operation. There was a regular army of folks came to run me for a while. Good land, but they were green! There were barbers, jewelers, laborers, clerks, bricklayers, and all sorts of people who had worked at all sorts of things. And all they knew was to put in a new shell for me to work on. I did the work and most of the time did it in spite of those who were supposed to be bossing and running me. They'd never seen the inside of a machine shop before. Lots of times they weren't even on speaking terms with a monkey wrench, and they knew about as much regarding a cutting tool as a cigar store Indian does about running a lawn mower.

Well, that was three years ago now. It was the longest three years any person ever lived. Men who were working around me were making big money, more money than they ever thought of making, and the harder they worked me the more money they made. Yes, when I look back over it all I put a lot of people in pretty fair shape to stand some slack times, but, of course, whether they knew enough to save their money was none of my business.

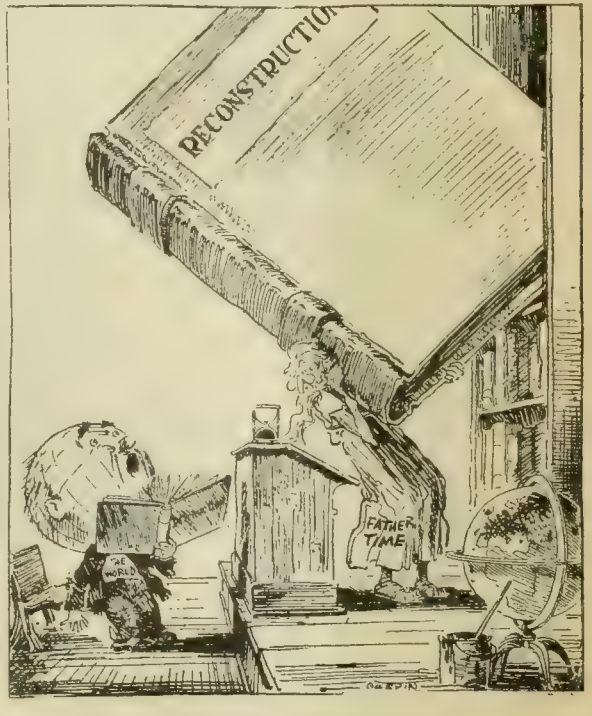
Folks called me a single-purpose tool. I didn't know exactly what that meant. Neither did a lot of folks who worked around me. Why, one chap let me get so hot one night that I was squeaking like the boots of an elder taking up collection on Sunday morning.

However, that was some time ago. The war quit, and I had a rest. The man who bought me said that I didn't owe him anything. I had done a lot of work, but he didn't know what he'd do with me now. I was in the road. They took me out of the old place where I'd stood for three years, put a roller under me and away I went out into the shed. There were no shaftings, no motors, no shells, nothing but old truck, and I knew very well that it was good-day to me. And I had turned thousands of shells, and had stood up under all sorts of treatment, but here I was stored away. It wasn't long before I had a patch of rust on the end of my nose, and another on my ear. Spiders came along and put their criss-cross marks all over me, and the dust blew in from the road and made me look like a hobo on a hot day in August.

Well, it's all settled now. A scrap metal dealer came along with the boss and looked me over. He had a flash-light in his hand and he turned it on me. I blinked. Just as they were going out I heard the junk dealer say, "I'll give you $18 a ton for it." I knew that "it" was "me." And so to-morrow I'm going to get on the junk dealer's truck and be cashed in at $18 per ton.

But I've no grouch. They're not using me a bit worse than this old world uses lots of other people. You may be a dandy in your day, and perhaps you scramble up into a position where folks will think you're filling up quite a big gap in the universe. But say, don't fool yourself. Some day you'll get yours. The old junk dealer will come along and he'll give you the once over. You may think you've got quite a lot of kick and use in your old hide yet, but hold on. You may argue that you were a dandy in your day and that you were courted and much sought after, but don't fool yourself. The junk dealer—and old Father Time is the greatest of them all—will make his bid. You may go in at $18 per ton, perhaps more.

This world has got a great habit of tossing a lot of people into the discard every year, and the single-purpose machine is simply having a taste of human life when it goes under the junk hammer at $18 per ton.



"AND THE NEXT LESSON WILL BE—"
—Chapin, in St. Louis "Republic"

WILLIAM BAIRD HAS PASSED AWAY AT GALT

Leading Citizen in That City—Sales Manager for the Canada Machinery Corporation.

WILLIAM BAIRD, sales manager of the Canada Machinery Corporation, Galt, died at the General Hospital, Toronto, on Wednesday, February 12. Referring to the demise, a Galt despatch says:—

The sad news of the death of William Baird, which occurred at 2.30 o'clock this morning in the Toronto General Hospital, will be received with the greatest regret by his wide circle of friends and business associates throughout the city. The deceased, who was in his 59th year, had been ill for the past two months and it was only on Thursday last that he went to the General Hospital in Toronto. He was born in Kilmarnock, Scotland, and came to Canada 39 years ago and had made his home in Galt

The Late WILLIAM BAIRD.

Deceased was an ex-member for the Galt City Council and took a keen interest in educational matters, for the past two years being a member of the School Board for Ward 3. He was a member of the Masonic order, also of the Galt Club.

Active Church Worker

In religion an Anglican, he was one of the leading members of Trinity Church and active in many of its organizations. He occupied a position of honor and responsibility in connection with the Diocese of Huron, being at the time of his death Honorary Lay Secretary of the Synod of Huron, a position he had held for the past three years. He had served as a church warden and a lay reader and was a member of the select vestry. It was in the Sunday school and Bible class that his greatest influence was felt. He was Superintendent of both Trinity and St. David's Sunday schools, and for many years had taught a large adult Bible class. St. David's Sunday school in the east part of the city owes its continued existence to Mr. Baird's loving labors and energy.

He is survived by his widow and four daughters, Mrs. Wm. Alison, Mrs. Gordon White, Mrs. Nellie Misener and Miss Helen, all of Galt. Six brothers and one sister, also survive, as follows: James and Robert, of Galt; Alec and John, Hespeler; Richard, London; Crawford, Lansing, Mich., and Miss Maggie Baird, Cambridge Street; W. J. Baird, of the W. J. Baird Machinery Co., Detroit, is a nephew of deceased.

What Does Bolshevism Accomplish?

A GERMAN spy, jail-bird and robber; a deserter from the Russian army; a convicted counterfeiter. Such are a few of the types which the Bolshevists have selected for some of their Soviets.

We speak many times of Bolshevism, but how little we understand its meaning! It means something or other, and that's about as close as we can come to it.

General A. Dobranjanksky, who recently arrived in New York as the representative of a group of united Russians, has this to say:

"As an instance of the calibre of men composing the various Soviets (self-elected representatives of the Workmen's and Soldiers' Committee), let me cite a few names of the members of the Soviet of Blagowestchensk. We have the president, Tobelson, a German spy, ex-jailbird and robber; Mochin of the executive committee, a deserter from the Russian army, a counterfeiter and ex-jailbird; his assistant, Tehatkovsky, also an ex-jailbird; Commissioner of Prisons Emilianoff, a jailbird and robber; his assistant, Nakileff, previously condemned to jail for robbery; the commissioner of food, who was convicted for misappropriation of funds; Korovin, commissioner of schools, an ex-jailbird; Tillick, convicted for robbery, now commissioner of finance; Mithin, commissioner of militia, an ex-jailbird, and finally, we have as commissioner of health an illiterate peasant. And these are the men who are at the head of affairs in Russia to-day!"

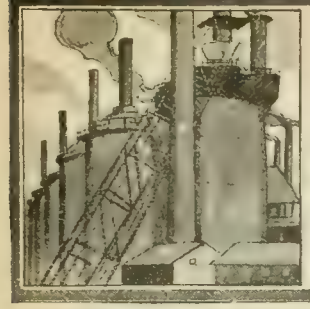
Prof. Ludovic H. Grandys, who at the outbreak of hostilities was a professor in a Holland school, himself a pronounced Socialist, says:—

"I personally saw the application of the theory to many factories. For example, Koopp's agricultural machine factory, employing 500 men, at Alexandroffsky, near Rostoff. The council of workmen in this factory voted to make Koopp an employee at 500 roubles a month, and made one of the loudest-talking workmen (who was also president of the Soviet) director of the factory. They voted themselves salary increases from 800 to 1,000 per cent. Every day the workmen held meetings, sometimes lasting several hours, in the factory. There they discussed rights and privileges, but the words duties and obligations were unknown to them. They also voted themselves the right 'as an intellectual necessity' to read newspapers during supposed working hours. Nominally they 'worked' eight hours, but literally not more than four and a half a day. But they paid themselves for all time spent in meetings, reading newspapers, and loafing. The funds they obtained by rifling the factory vaults, and when they were empty they went to Koopp's house and to the banks where he kept his private account and, under threat of using arms, took away what money remained. In all, they seized about 1,000,000 roubles."

For over a year after the revolution in Russia Sir George Buchanan was British Ambassador in Petrograd. He was in a position to note what the revolution did toward the debauchery that seized upon Russia. In a recent issue of the *Fortnightly Review* he gives his views. In part they are as follows:—

"Nobody's life is safe—all their political opponents, whether belonging to the Socialist or non-Socialist parties, to the working class or to the aristocracy, are styled counter-revolutionaries, and as such are judged guilty and condemned to death. The process of passing sentence on individuals is even found too slow, and they are massacred in batches, the Red Guard or the Chinese mercenaries employed as executioners being free to choose their victims from the lists of the proscribed. Such are the methods by which those pseudo-democrats, Lenine and Trotzky, have attempted to found their Socialistic State, and such are the precepts of the Bolshevik gospel which they fain would see preached in this and other countries. The sympathy felt in certain quarters for Bolshevism is due entirely to ignorance of what Bolshevists really are. They are not democrats as we understand the meaning of that word. They are anarchists, and I am convinced that were any of our so-called Bolsheviks to go to Russia and see with their own eyes the crimes that are being committed there in the name of liberty, they would never call themselves Bolsheviks again."

Bolshevism is not socialism; it is not state ownership. It is the brigand run wild, the anarchist cut loose from all moorings. Murder is its weapon, and looting a popular pastime. It is not a thing to be played with, tolerated or argued about. The best way to combat it is to see that the conditions of poverty and unrest under which it thrives are removed from our national fabric.



MARKET DEVELOPMENTS

Too Much War Machinery in the U.S. Market

The Automobile Industry is Buying Enough to Help Out the Situation to a Very Great Extent—Scrap Metal Prices Are Battered Down to Levels Not Half of Their Former Greatness

MACHINE tool dealers express no pleasure in the way in which the market is being glutted with war material in United States. The same thing holds good in Canada, but not to such an extent. If the thing were all averaged up it would be found that of the war machinery brought out in Canada and United States this country had much more of it in actual operation at the signing of the armistice. Buyers make inquiries for this sort of material, although dealers are not assisting or encouraging the development of this class of trade.

Warehouses are doing a good business now, but it is not always a good sign to see the warehouse interests too busy. It is well to look back of it and see what it means. It often points to the fact that the large users of materials are not placing stuff in their own sheds. They are out of the market as large purchasers for future operations. They draw on the warehouse interests on a hand-to-mouth plan rather than buy as though the market had settled. They apparently do not consider that prices are yet at the point where they are attractive enough to make them stock up with raw materials.

The steel trade is keenly interested in prices now. The prevailing price on steel plate of six cents per pound is felt to be too high to allow of anything but the most urgent buying. Deliveries can now be secured on the lower U. S. prices, and it would cause no surprise were a reduction to 5½ or 5c be made very shortly. Such a course would have the effect of making the possible buyer feel that he was not taking any chance of losing if he were to do his buying now instead of pursuing the policy of waiting, which threatens to bring the market to a period not far removed from stagnation.

The only thing that happened to the scrap metal prices this week is that the dealers went at them and battered them down still farther. They are in many cases just half the inflated values that were being secured during the period of the war. There is no trade moving. Those with material on their hands are anxious to sell, but buyers are not open to stock up. Dealers reckon now that there are 400,000 tons of scrap steel in the country in the shape of shell blanks, 250,000 tons of which belong to the I.M.B., and 150,000 to the U.S. Ordnance Department.

LITTLE PROGRESS IN MONTREAL TOWARD MAKING SHOP ADJUSTMENTS

Special to CANADIAN MACHINERY

MONTREAL, Feb. 20.—The gradual return to a domestic working basis is evident in the steady declines that are taking place in the markets. This is essential to develop the interest of the general consumers, as it will enable them to undertake reconstruction problems with some degree of assurance. Uncertainty has been the chief reason for the delay in the renewal of nominal activity, but it is anticipated that conditions are nearing the point where confidence will be restored, and pave the way for general activity on a greater scale.

Developments Progress Slowly

Little can be gleaned from the statements made regarding the general steel conditions. Dealers are reluctant to predict, in any way, what the future may have in store, and current operations are no fair indication of early developments. Every sale or transaction only emphasizes the uncertainty that predominates throughout the trade, and virtually no purchases are made for materials other than those required for immediate or very early consumption. This applies mostly to such commodities as are of a domestic nature; the demands for marine and locomotive requirements being steady and sufficiently large to insure continual operations. A feature that begins to affect the industry is the gradual accumulation of stock being produced at those mills working at or near capacity. Unless a heavier buying market develops it may be necessary to further curtail production of some of the mills, which in some cases would mean the closing down of the plant, owing to the high operating cost of the furnaces In the opinion of the producers there is little possibility of a material wage reduction for a year at least, and for this reason cannot see how steel prices can go much lower than the present level. Owing to the world food supply being low and the fact that a season or two will be required to again return to normal, the high cost of living will continue, and therefore little chance is offered for easier labor conditions, even in face of considerable unemployment. General steel activity is steady, but actual business is not brisk. Demand is largely regulated by the prices ruling, and when it is understood that quotations cannot be severely cut under existing conditions, confidence may return and more activity develop. In many lines the dealers here are not overstocked, and would be in a good position to meet any reduction of prices, originating at the mills. One phase of present operations is the fact that many plants are piling up stocks as a means of keeping men employed, and with such stocks on hand it will be expected that selling prices on such material must be in accord with the cost of production. Local dealers report unchanged conditions with volume of business fair and steady; price quotations here are firm and unchanged, with a weak tendency.

Easier Tone in Metals

Activity in metals is confined to the

sale of small lots for present needs, little interest being shown in futures. Dealers are not anxious to stock up at present prices and are only satisfying the requirements of customers. Quotations continue to decline to lower levels, largely due to the light demand and the fact that production exceeds the trade requirements. A general decline is noted here in all but spelter and aluminum, which are firm at 9½ and 40 cents respectively. A drop of 3 cents is noted in copper, the current quotations being 23 cents for lake, and 22 cents for electro and castings. Demand for tin is light and supplies are coming through better, this week's price of 62 cents representing a drop of 8 cents per lb. Lead is slightly weaker at 8 cents. Antimony is one cent lower, the quotation being 9 cents per lb.

Quiet in Machine Circles

Conflicting reports are given by different machinery dealers as to the volume of business that is being carried on. Some state that the demand for general equipment is of fair proportion, while others report few sales for the week. Some interest is displayed as to what the U. S. Government will do with the machinery now installed in those Canadian plants that were engaged in the making or had contracts for American shells. At present the equipment is being appraised by U. S. valuators, but in few cases has a settlement been definitely made. The bulk of these tools are of a special character, and it is doubtful if they can be adapted economically to general industrial practice, but much standard equipment in these plants will be released when the Government states their intention regarding such equipment. There are two facts that prevent a more general return to pre-war activity: the relative high price of machine-tools and the uncertain labor situation, features that are of considerable weight in the stabilization of post-war conditions. Supply demand is steady, but volume is light.

Scrap Prices Falling

The old material situation might well be defined in the two words—nothing doing. Little definite information can be gained as to the actual price the dealers are paying, owing to the light trading at the present time. Some business is passing, sufficient to warrant dealers from closing their doors, but the volume is not enough to permit a definitely fixed price on any commodity. The accumulation of war scrap is very large and the movement of this is practically nil, so that the unsettled condition is likely to remain a feature for some time The market is quiet and quotations have declined, old metals have been lowered from one to four cents per lb. Coppers are easier by about three cents per lb. Iron and steel scraps are weaker with sales light. Declines range from one to twelve dollars per ton. Axles show a sharp drop, wrought iron being quoted at $20, and steel axles at $22, a decline of $16 and $12 per ton respectively. Present nominal prices are given in the selected market quotations.

POINTS IN WEEK'S MARKETING NOTES

The automobile industry is helping to save the situation at present for the machine tool dealers of United States. Their buying is liberal and covers a wide range.

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Canadian dealers feel that the six cent price for plate is too high. It is now possible to take advantage of the lower U. S. prices, which make it 3.75 at many Canadian points on mill shipments, and for more direct delivery 4.27 at Chicago warehouses, or about 5.05 at Toronto.

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Sheet prices are being shaved pretty close, although no reduction is announced in market quotations. One order that called for sheets for an automobile firm was priced on several times by various firms, and considerable concessions were obtained by the operation.

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Dealers in machinery report that there is a decided leaning on the part of purchasers of equipment to pick up shell shop equipment of the general purpose type. It is hindering the sale of new machines, and dealers are not encouraging the movement.

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The only change in the scrap metal situation this week is that the dealers have again cut the prices at which they will consider purchases. A good many lines are now at 50 per cent. of the inflated values that were ruling in war days.

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Warehouses handling steel products report that February is a much better month than January. This may or may not be a good sign. When warehouses are very busy it may be taken for granted that the large manufacturers are not stocking up, but drawing on the warehouse interests instead, on a hand-to-mouth plan.

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Steel interests trying to control the situation state that they want to have prices fixed by quarters, the same as during the war. But it looks as though the first quarter may see two reductions instead of one.

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Some of the steel mills want to reduce labor costs, but they are speaking very gingerly on the subject, and do not want to make a move until they are forced to do so.

SCRAP MATERIAL LIST BATTERED DOWN AGAIN

Business is Not Brisk—Some Small Sales—Demand Strong for Used Machinery

MACHINE tool dealers report that there are frequent sales being made to smaller concerns, and that they are estimating on machines for a number of large equipments. But for actual selling right now, it is in a rather limited scale, especially when compared with the tremendous volume of business that moved during the war.

Estimates have been submitted quite freely on the list of tools asked for by the National Railways. There are some 27 machines in the list issued about two weeks ago, and the chances are, with the present anxiety on the part of dealers to keep things going, that some pretty close prices will be submitted.

Although dealers for the most part frown on the trading of shell shop equipment, it cannot be denied that there is a fairly large demand for machine tools that come under the heading of general purpose machines, taken from shell shops. In some cases there are machines of this sort, purchased to work on orders that were cancelled before operations proceeded very far. Some purchasing is being done of this material at prices that will make the investment an extremely light one.

The Warehouse Business

Some of the warehouses in the city are busy, especially those handling steel plate, sheets, shapes, bars, beams, etc. It is not always a good sign to see warehouses busy. It means—and the present is no exception—that the big users of material are drawing from the stocks of the warehouses instead of buying direct from the mills for their own use. Users of material in a big way are anticipating better prices later on and they hesitate to buy for their own warehouses. They seem to prefer a hand to mouth business, and pay a higher warehouse price rather than run the danger of stocking themselves in a market that is, to say the least, weak.

One of the leading warehouses in Toronto stated to CANADIAN MACHINERY to-day that by the 15th of February they had more business on their books than they had done during the entire month of January.

While this may be so, there is a growing feeling that the Canadian trade must move toward lower prices. In plate, for instance, the price is still placed at six cents. Although this is somewhat of a concession from the heights that were attained during the war, it is so high that business done under it is confined to necessary purchases only.

The man who is buying plate wonders at the price. He starts with the three cent price at American mills, adds freight, duty, war tax and brings the price up to about 3.75. It is to be expected that a warehouse price at any time will be in advance of the figure

quoted at the mill, as delivery is quicker, and prompt shipment is often worth paying for. Chicago warehouses are quoting plate at 4.27, which would make the price laid down here 5.05. Some Montreal houses make 5.50 their price, and it would cause no surprise to find that a five cent price had been declared shortly.

The way prices are being shaved for business seems to indicate that it will not be long before there will have to be closer recognized values. For instance there is an order up this week with a firm of auto makers. It is for sheets, and is not a large mill order, but a nice little business for a warehouse to handle. A Toronto dealer put in a price that seemed certain to him good enough to land the business, but he got word that he was high. Market prices had been shaved off and in turn the first dealer mentioned sent in a second price. It is instances of this nature that make it certain that lower prices are not far off.

Scrap Cut Again

The only thing the scrap metal dealers have done this week is to proceed with the assassination of the price list in several of the leading lines. They have succeeded in removing prices a very respectable distance from the points reached during the war period. They have also put up a schedule that will not encourage offerings to come into the market. Below are given a few items and the figures that show the manner in which the offerings for them are receding:

Heavy melting has been $15, to-day $14, in September of 1918, $22.

Shell turnings, in war days brought about $12 per ton; after the war ended the price stayed around $8, while to-day dealers are offering $6 and they are not anxious for deals.

Boiler plate is quoted as low as $11 to-day. For a few weeks it has been at $15, against a war time quotation of $22.

Rails have slumped to half their war value. To-day's quotation is $11, against $15 of a few weeks ago. September of last year saw them bringing $23.

No. 1 machine cast scrap was as high as $33 per ton in war time. Following the stoppage of war it fell off to $18, while to-day dealers might pay $14 for offerings, but it is doubtful if they would go higher than that price.

Malleable scrap is marked at $13 to-day, against last week's $15, while the war price would run close to $20.

Wrought pipe was lowered $1 to-day, to $7 against the previous price of $8. Last September $17 was the prevailing price.

One of the largest scrap metal dealers in the city estimated, in conversation with CANADIAN MACHINERY to-day, that there are 40,000 tons of shell turnings and about 400,000 tons of billets in the country at the present time. The estimate placed 250,000 tons as the property of the Imperial Munitions Board, and 150,000 tons as belonging to the U. S. Ordnance department. The average consumption of this country in heavy melting steel, in which class the billets come, is about 100,000 tons, so it does not seem likely that there will be much demand for some time. The shell material is a desirable form of scrap for the melters. It is easily handled. Some of it has been sold and the value of it is about $12 per gross ton.

A certain amount of shell shop equipment has already gone under the drop hammer for reduction to cupola sizes. As a general thing it is desirable material, most of it being only from eight to ten per cent. steel, which has to be separated.

AUTOMOBILE INDUSTRY IS SAVING THE DAY FOR AMERICAN DEALERS

Special to CANADIAN MACHINERY

NEW YORK, Feb. 20.—Expansion of the American automobile manufacturing industry is the most conspicuous feature of demand for machine tools. The purchases of the Ford Motor Company, Detroit, have reached $1,000,000 or more, and include 60 Bullard multiple vertical turret lathes, reported in a previous letter, and 100 Fellows gear shapers. The General Motors Corporation has been buying extensively for its Chevrolet factory at Toledo, Ohio, and the Willys-Overland Company, also at Toledo, has added considerable new equipment. The H. H. Franklin Mfg. Co., Syracuse, N.Y., bought about $300,000 worth of new tools from the United States Government at 60 per cent. of their "war-time prices." The New Process Gear Corporation, at Syracuse, has issued a list of about 50 miscellaneous tools wanted for the manufacture of automobile gears. A new automobile company, to make a small, low-priced car has been organized, with $1,400,000 preferred stock, by F. C. Chandler and Samuel Regar of the Chandler Motor Car Co. Cleveland, Ohio. A new plant will be built and equipped. Other automobile companies in the Detroit, Mich., and Cleveland, Ohio, districts have also been buying to round out their equipment and replace tools worn out by war work.

Development of the tractor manufacturing industry has also produced some new business in machine tools. The General Ordnance Co., Derby, Conn., has purchased the National Tractor Co., Cedar Rapids, Iowa, and has turned over its Derby plant, used during the war entirely for the manufacture of ordnance, for tractors. The Nelson Blower Co., South Boston, Mass., which was making parts of machine guns, is also engaging in the manufacture of tractors. Both of these companies have bought new equipment.

Otherwise there is not a great deal of business being done by the machine-tool builders. Many inquiries are being received, but it is evident that some of the quotations wanted by manufacturers are for appraisal purposes in settling claims against the Government for war work. Some manufacturers undoubtedly need the equipment for which they are inquiring, but after receiving prices they decide to wait for expected reductions.

The United States Shipping Board is promoting the organization of private companies for the construction of dry-docks and ship repair plant along the Atlantic Coast. Two companies have virtually completed their organization and will inquire soon for equipment. Others are in the formative state. The Shipping Board will furnish a part of the required capital if reliable private interests will furnish the remainder and build the plants. About 20 dry docks at New York, Boston, Philadelphia, Baltimore, Norfolk, and other parts in contemplation.

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., is placing orders for equipment for a large boiler plant to be built at Richmond, Va. This project was approved early last fall, and then was cancelled when the armistice was signed. Some of the orders placed at that time are being reinstated, notably one for eleven overhead electric cranes with the Cleveland Crane & Engineering Co., Cleveland, Ohio. Considerable plate-working machinery will be required.

An inquiry from the Navy Department, which will soon come before the crane builders, is one for about 20 cranes for the Government armor plate plant to be built at Charleston, West Virginia. Most of these will be large cranes, some up to 250 tons capacity.

American machine-tool builders are greatly concerned over the export situation. There are many unfavorable features, which pessimists construe as being discouraging to the hopes which had been entertained that France, Belgium and also England would buy quite extensively in the United States. The British embargo is a most discouraging feature, and reports that this embargo may last a year have added to the gloomy feeling. Furthermore, the reported action of a selling oganization of British machine-tool builders in seeking agency connections in Holland and European countries by offering exclusive rights on the British tools if no American tools are handled has created a feeling that British competition is adopting some of the German methods of before the war. Of course, such reports are fragmentary and the worst possible construction is apt to be placed upon them by those who already feel somewhat resentful over the British embargo. As to the embargo, there is a disposition in

most quarters to admit that England is justified in protecting her own industries and labor. Those in this country who are protectionists, and that includes a majority of the manufacturers, can scarcely be so inconsistent as to deny to England that protection which she is taking by means of an embargo, which finds expression in this country in advocacy of protective tariffs.

French officials in the United States have stated repeatedly, publicly and privately, that France will buy very little machine-tool equipment here, at least not for some time to come, but there are reports that a syndicate of French manufacturers is contemplating buying several million dollars' worth of tools here. Financial arrangements will probably have to be made first, if the latter report is true. Belgium has already arranged with New York bankers for a $50,000,000 loan, which is said to be only a beginning. Some of this money will undoubtedly be spent for equipment that will enable Belgian industries to resume operations.

The American Government will doubtless offer for sale in France, at greatly reduced prices, the many millions of dollars' worth of machine-tool equipment, which was shipped over there for ordnance and airplane work, railroad shops, etc. Negotiations to this end are understood to be now under way.

Overhanging the domestic machine-tool market like a dark cloud is the immense quantity of machine tools which the Government will dispose of. American machine-tool builders have shown opposition to the plan proposed by the director of sales for the Government of buying back these tools at fixed valuations, which would be about 25 per cent less than their present invoice prices. In the event that the machine-tool builders do not take the tools back, the Government will offer them for sale. Such action is even now in prospect, and as a majority of the tools are as good as new, they, no doubt, will be eagerly bid for, and the prices paid will undoubtedly be much lower than the machine-tool builders are asking for the same tools. This will probably have a demoralizing effect upon business. A project to distribute a large part of the tools among trade educational institutions is being considered by Congress, a bill authorizing such action having been introduced This, it is felt, would put the tools to good use and remove them as a market factor.

THE SEE-SAW OF WAGES AND COSTS IS COMING TO AN ACUTE STAGE

Special to CANADIAN MACHINERY

PITTSBURGH, Feb. 20.—The steel market has been going from bad to worse as regards demand. Thus far this month demand has been distinctly lighter than at any time in January and the past few days have shown still lighter demand than was seen early in February. Meanwhile old orders are running out at the same time so that the mills are trending to a position of having hardly any shipping orders at all to run on, while the producers who have been putting material into stock will soon find their storage facilities exhausted.

Heavy January Production

The monthly report of steel ingot production is out, and shows heavier production in January than was currently estimated. Allowing for the companies not reporting, the monthly statement being based on returns for 29 companies and showing 3,082,427 gross tons of steel ingots produced in January by the 29, the country's rate of ingot production in January was 41,700,000 gross tons a year. This is 3.8 per cent. below the average rate in November and December and 11 per cent. below the rate last September, which was the heaviest rate in the history of the industry. Production in 1918 as a whole was about 40,400,000 tons.

The official statistics showing precisely the production in 1917 have just been made public, the collection of the figures having been delayed by the war. The production of ingots in 1917 was 43,619,200 gross tons, against 41,401,917 tons in 1916, previously the record year. In our report published in CANADIAN MACHINERY, October 17 last, we estimated the 1917 production at 43,700,000 tons.

As the January output was 85 per cent. of the estimated capacity, 49,000,000 tons a year, it was a remarkable heavy output, and one that was not supported by the current demand. If in this transitionary and unsettled period, with everyone complaining that there is practically no demand, tonnage equal to 85 per cent. of capacity could actually be absorbed, it would mean that the steel famine coming would transcend the apparent famine there was during the war. In other words more steel was made in January than was needed and this month while production is at a lower rate, there is still too much. Some time there will have to be an equalization.

The Stocking of Steel

Precisely to what extent the United States Steel Corporation subsidiaries are stocking steel is not known, but it is generally known that the process is going on and covers an important tonnage, perhaps one-third of the corporation output, which is now at the rate of about 85 per cent. of capacity. Independents are operating at an average of about 50 per cent. of capacity and it is not likely that the Steel Corporation's actual orders call for shipments at much heavier rates than do the orders on which the independents are working. A few weeks, perhaps two months, would mark the limit of storage capacity.

Price Prospects

Demand for steel having decreased of late rather than increased, producers are giving more thought to the matter of making another price reduction in order to stimulate demand. It is hardly likely that much business would be brought out by a reduction, but something would of course come. All buyers have been in expectation of successive declines, and the longer the period stretches from the last decline, which occurred the middle of December, the more the buyers feel that a fresh decline is imminent and the more disposed they are to postpone buying in order to get the benefit. For several weeks there have been persistent rumors that there would shortly be a batch of price reduction, this not to interfere with reductions April 1, the date long ago mentioned as one upon which reductions would likely be made. When the war ended and the War Industries Board refused to have anything more to do with price fixing the steel trade took up with the idea that if there were to be price reductions it would be well to have them come on the quarterly dates, in continuance of the practice established by the War Industries Board of setting prices for a quarter at a time. Now it looks as though there might be two reductions per quarter instead of one. Producers are anxious to do something to stimulate demand and at the same time they do not want to overstay their welcome on present prices, for fear indiscriminate cutting might be started, and once started there would hardly be any end to this process. The current rumor is that the reduction will be $4 a ton and will apply to bars, shapes and plates, possibly to other commodities, such as pipe. Wire and tin plate might possibly escape reductions, not only at this time but also April 1.

Building Prospects

At last it has become generally realized that there cannot be much general activity unless there is building of various sorts, the ordinary everyday needs of the people not being sufficient to keep plants busy and furnish employment to all men. Private investors shrink from going ahead at the present time on account of costs being so high, as they feel they can make more money by waiting. Plans are now on foot by the federal Government and by states and municipalities for construction work of various sorts, particularly the erection of public buildings and construction of roads. It is recognized that there is a loss in doing such work at this time, but it is considered a public benefit to have the work done now and furnish the employment, hence the general public should foot the bill rather than the private investor. The federal Government is going in for many public buildings, the state of Pennsylvania has a large road building program under consideration and New York, Pittsburgh and other cities have extensive plans under advisement. These various projects will make a great deal of employment but they do not involve much iron and steel.

Steel and Labor

The steel producers are not particularly anxious to reduce the wages they pay. They realize that no attempt could be made without running the risk of starting a great deal of trouble, but even if a 10 or 20 per cent. wage reduction were made, simply in the steel industry proper, it would not greatly decrease the cost of making a ton of steel. The steel producers do feel it quite advantageous, however, to argue that as long as they cannot reduce wages they should not be expected to reduce selling prices of steel. What concerns the steel producers much more than wages they pay is the wages their customers have to pay. There is altogether too much labor cost in erecting a bridge or a building, for instance, and that is more of a deterrent influence than the high wages paid in making the steel.

FURTHER DECLINES REGISTERED IN THE U.S. SCAP MARKETS

THE scrap market has not yet finished descending. In some parts of the country prices are remaining stationary, while in others further declines are taking place. There is a little demand, and scrap dealers are losing money fairly regularly. Following are reports from principal centres:

CHICAGO.—The market is quiet in every department, and very little buying is taking place. There does not seem to be any accumulation, in spite of the small amount of tonnage being moved, and it is thought that any revival of buying would result in a sharp advance in price. The Northern Pacific offers 1,700 tons, Chicago, Milwaukee and St. Paul 1,200 tons and the Chicago Great Western 500 tons.

NEW YORK.—A further decline is in evidence here. Heavy melting steel has sold at $11 f.o.b. New York. Some grades remain steady, notably clean cast borings, which are holding at $10 and stove and grate bars at $16 to $17 f.o.b. New York.

PHILADELPHIA.—There is only a small demand for scrap. Rerolling rails have been established at $17 to $18 delivered, and old car wheels are now $22 to $24 delivered, based on actual transactions. Heavy melting steel is at $15 to $16 delivered, low phosphorus is at the nominal price of $20 delivered, for guaranteed material.

PITTSBURGH—There is hardly enough business moving to base quotations on. During the week a sale of 1,000 tons heavy melting steel at $17 delivered took place. One company has been buying freely of machine turnings at $9 per ton delivered, and cast borings at $12.50. The production of scrap is far ahead of consumption, and while this lasts there is not much hope for improvement.

BUFFALO.—Prices have been remaining at the same level here for the last two weeks, and hopes are entertained that the end of the decline has been reached. The stocks are diminishing and it is hoped that if mills keep on at their present rate of operations that they will have to come into the market for further supplies. Some small sales were recorded during the week.

CLEVELAND.—A resting place has been reached in the steady descent of prices, but dealers generally do not look for any improvement in prices until late next month. Heavy melting steel is selling at just half the last Government fixed price, which was $29 delivered. What scrap is now changing hands is limited to carload lots, and yard men are picking up some choice bargains.

CINCINNATI.—Foundries and steel mills have more scrap than they can take care of, and what scrap is offering can find no buyers. Last week was thought to be the end of the decline, but it is still going on.

ST. LOUIS.—The same story applies here as in most other parts of the country. The end of the decline is not yet in sight. Heavy melting steel was sold at $16, and every other grade was marked down. The three largest consumers in the district have announced that they are out of the market. A feature is that there is an abundance of pig iron available, and many mills that were using scrap largely as a substitute, can now get all the pig they require.

SOME SALES OF PIG IRON ARE BEING MADE TO FOREIGN BUYER

THE market for pig iron continues generally speaking to be dull. In Virginia pig iron prices have been established at $31 furnace, for foundry iron, No. 2 plain or $1.75 to $2.25 silicon, and at $34 for No. 1 or $2.75 silicon and up. Some sales have been made at these prices. In the eastern market a better demand is in evidence, enquiries from domestic buyers showing a greater interest than for some time past.

NEW YORK.—The outstanding feature of the past week was a sale of 4,000 tons for export. The buyer is not known, but it is understood that the same interests bought largely from the seller before the signing of the armistice. Enquiries for 3,000 tons low phosphorus for China, are among the many foreign enquiries, but there are many more enquiries than sales. One eastern furnace has made some small sales on the basis of $32.50 at the furnace, and this price represents concessions of from $1.50 to $2 per ton on two plain iron delivered at Newark, Jersey City and New York as compared with prices based on delivery at these points or a Pittsburgh base.

PITTSBURGH.—Although there is visibly no business going on, there are quite a few lots changing hands in a quiet way. Two or three lots of re-sale basic has been sold on a basis of $29.50 f.o.b. valley furnace. The market may be generally said to be firm, merchant producers being content to hold their iron, believing that a reduction in prices now would not help sales.

BUFFALO.—Plenty of enquiries with an infinitesimal amount of business seems to be the situation in this district. Buyers are of the opinion that prices are due to drop, and are using enquiries as a means of feeling out the market. Makers on the other hand are more inclined to shut down their furnaces than to make any price concessions. One maker says he does not expect a return to the normal before 1920.

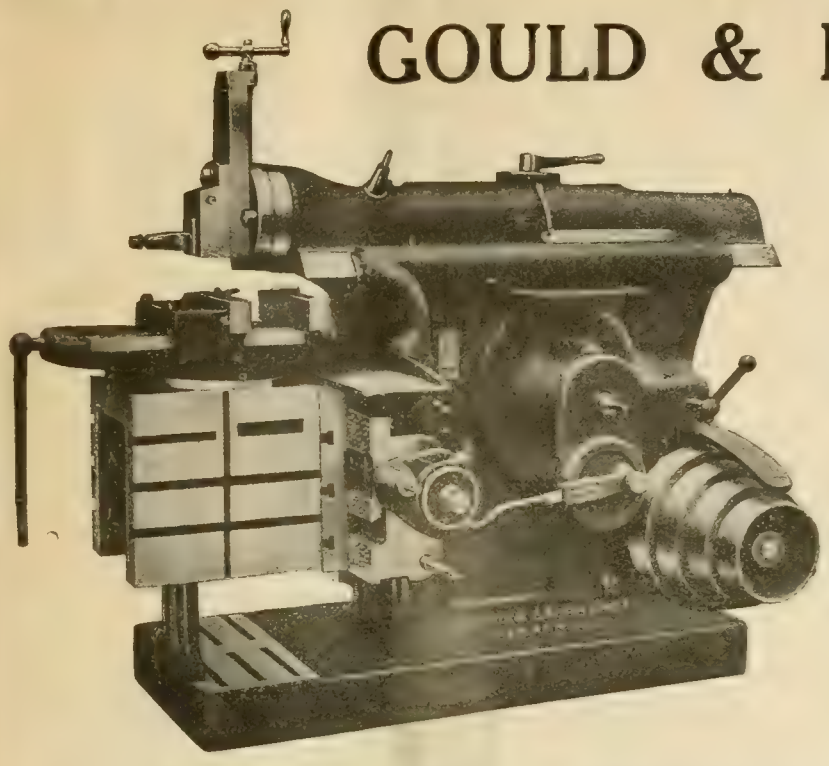
CHICAGO.—No interest is being displayed here in buying pig iron. The buying for first half of 1919 evidently covered the needs and in some cases more than covered them. Small lots daily have aggregated up to 300 to 400 tons per week, made up of irregular varieties. Whatever enquiries there are are for small quantities for mixing.

ST. LOUIS.—Believing that further concessions are coming, buyers are sitting back to wait. Even those who need iron seem unwilling to enter the market. Actual sales have not amounted to 1,000 tons during the week. Some of the southern furnaces have announced a reduction to the $31 base, while others, though not announcing any reduction, have let it be known that they will consider offers at the lower rate.

CINCINNATI.—The price of iron already shipped, which was ordered before Government regulation ceased, is giving rise to numerous disputes, the settling of which seems to be taking up all the energies of the furnace representatives. Some of the contracts contained a clause that the last Government prevailing price was to rule, and these will not be changed. There is no other business moving.

BIRMINGHAM.—Filling old contracts seems to be the only activity here, and this does not require the full output. Production of pig iron is at a very low ebb, the production for Alabama during January being less than 181,000 tons. Practically all furnaces in the Birmingham district are offering No. 2 foundry at $31.

CLEVELAND.—Domestic enquiry is almost non-existent, but there have been some enquiries for iron for export. From New York comes a request for 3,000 tons low phosphorus and 3,000 tons No. 1 foundry for delivery to China. Though rate of production is not changing, there is considerable accumulation of iron. Customers are taking their iron ore on contract in rather slow fashion, and some extensions are being granted.



GOULD & EBERHARDT SHAPERS in Stock

20", 24" and 28" Sizes

Write for literature describing the Double Triple Quick Stroke and other original features.

IMMEDIATE SHIPMENT.

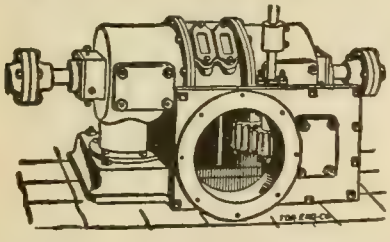
The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West,
TORONTO

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

If any advertisement interests you, tear it out now and place with letters to be answered.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton		
Victoria		

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$23 00	$ 24 00
Electro copper	22 00	23 00
Castings, copper	22 00	21 00
Tin	62 00	65 00
Spelter	9 50	8 50
Lead	8 00	7 00
Antimony	9 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 6 00	$ 6 00
Plates, 3-16 in.	6 50	6 25

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.

4½" and larger, 40%.

4" and under, running thread, 25%.

Standard couplings, 4" and under, 35%.

4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$13 00	$13 00
Copper, crucible	16 50	15 00
Copper, heavy	15 00	15 00
Copper wire	15 00	15 00
No. 1 machine composition	14 50	14 00
New brass cuttings	10 00	10 00
Red brass turnings	11 00	10 00
Yellow brass turnings	8 00	8 00
Light brass	6 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5 50	5 00
Heavy lead	3-4	5 00
Tea lead	2-3	3 50
Aluminum	18 00	12 00

Per Ton

Heavy melting steel	15 00	14 00
Shell turnings	8 00	6 00
Boiler plate	16 00	11 00
Axles (wrought iron)	20 00	15 00
Rails	20 00	11 00
No. 1 machine cast iron	20 00	14 00
Malleable scrap	15 00	13 00
Pipe wrought	10 00	7 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	14 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50 $5 30
Cut nails	5 85 5 65
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, æ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

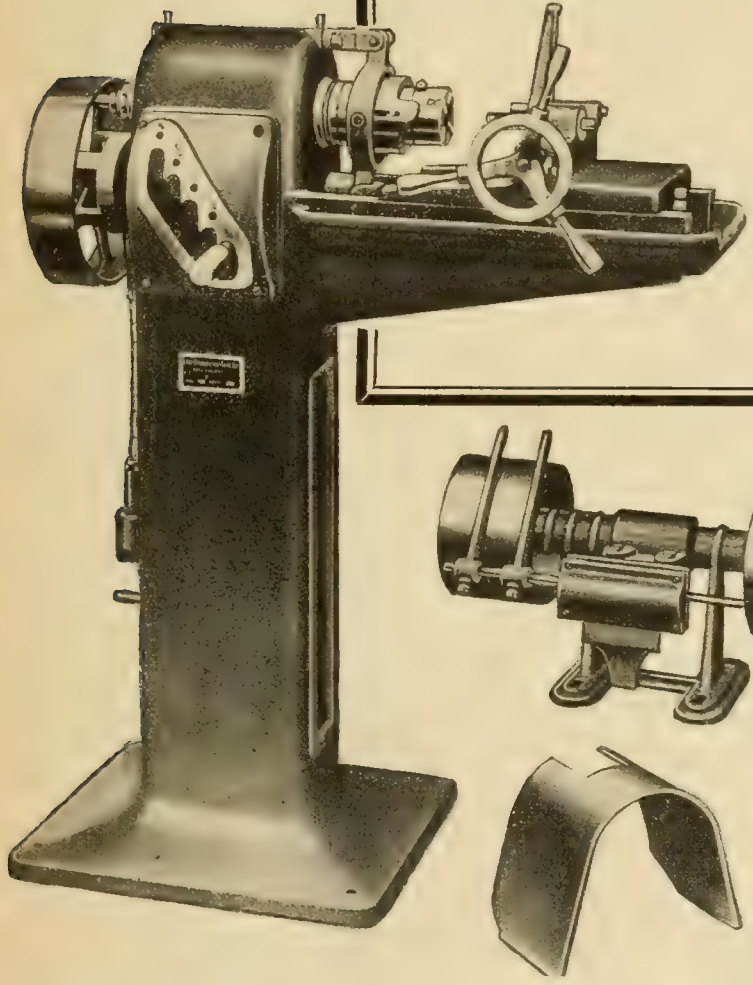
THE BETTER WAY

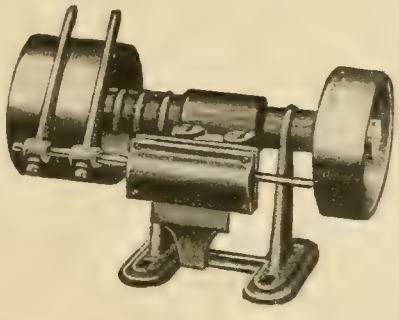
Just the way that suits. Small parts are most economically threaded with the Geometric Threading Machine. Busy automatic screw machines cannot profitably be slowed down to cut threads when there is a Geometric Threading Machine at hand. Especially since a Geometric Threading Machine costs one-tenth the price of automatics.

Geometric Threading Machines are employed on a large class of small threaded parts that cannot be produced economically on the ordinary screw machine.

Made in three sizes—to cut ⅛ to ½ inch, ¼ to ¾ inch, and ¾ to 1½ inch diameter threads. The carriage is mounted on slides and on the largest size machine is moved back and forth by rack and pinion, and in the smaller sizes by hand.

Spindle speed changes readily made, adapting the machine to the diameter and material of the work. An adjustable stop assures accurate length of thread, and automatically opens the die head, permitting of drawing the work straight back.





A line from you brings full details regarding this machine. Tell us your threading requirements — let us recommend the proper Geometric Collapsing Tap or Self-opening die.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 35
Solder, guaranteed	0 40
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 60%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 7 00
Sheets, black, No. 10	6 50	6 90
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.	Cts. per lb.		
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.			
Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.			
Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.			
Select White.	11	Dark colored.	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	10%	Best grades	15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

The Specifications Call For .0001±

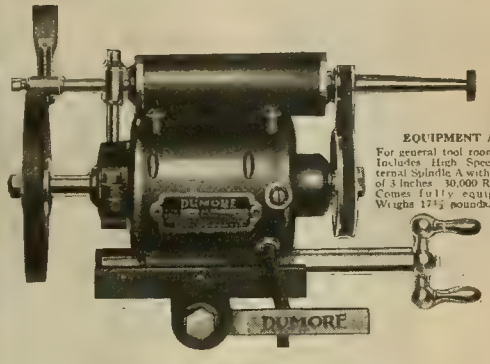
SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

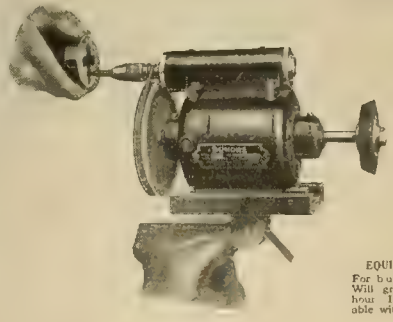
WISCONSIN ELECTRIC CO.

2908 16th St. RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.

EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

GEORGE E. DRUMMOND PASSED AWAY WHILE ON TRIP TO ENGLAND

Just as CANADIAN MACHINERY goes to press news was received of the death in England of George E. Drummond, of the firm of Drummond, McCall & Co., steel and metal merchants and manufacturers, Montreal and Toronto. Deceased was born at Tawley, Ireland, October 21, 1858. He came to Canada in 1865. He was largely interested in the iron and steel business and established an iron mining business. He established the present business, whose interests in Canadian iron and steel properties have since become merged in the Canada Iron Corporation, Ltd. He took a keen interest in civic affairs and in matters of national interest. In 1909 he was appointed consul-general for Denmark, and was also president of the Montreal Board of Trade in 1904-5, and in the same years was president of the Canadian Manufacturers' Association. Other activities that took up his attention brought him to the position of member of the managing board of the Montreal General Hospital, and also as governor, McGill University. He wrote several books and papers that were followed with very wide interest. Among these were "The Iron Industry in Canada," "Fiscal and Imperial Defence Questions." In 1910 he was elected Knight of Grace of St. John of Jerusalem. He was married to Elizabeth Foster Cockshutt, daughter of the late Ignatius Cockshutt, of Brantford. He had long been connected with the firm of Drummond, McCall & Co., and all his dealings with the business world were marked by a fairness and honesty that became characteristic of the entire policy of the company.

The Late GEORGE E. DRUMMOND

SOME DOUBT ABOUT BUILDING OF SHIPS

Senator Robertson Drops a Hint Regarding More Wages for This Work

Vancouver.—A warning that, "it will be difficult, if not impossible—" to maintain the shipbuilding in Canada, because of the high cost of producing ships as compared with cost in Britain, especially if it is to be interrupted by labor disputes, was conveyed by Hon. G. D. Robertson, Minister of Labor, in a telegram to Mr. Justice Murphy, who is investigating wages difficulties in the Coughlan yards.

Confirming this information, Hon. Mr. Robertson stated that any attempt to further increase employees wages in shipbuilding concerns in this country will jeopardize the future of the shipbuilding industry in this country. There is a danger already, he said, of it not becoming a permanent industry in Canada.

Now that the war is over, conditions are approaching their pre-war state, and Great Britain will be able, on account of her supply of iron and coal, and cheap labor, to underbid Canada in the making of ships.

IMPORTANT POST FOR HAMILTON MAN

Henry H. Biggert, of International Harvester, Has Successful Career

Special to CANADIAN MACHINERY

Hamilton, Ont.—Henry H. Biggert, for the past seven years general superintendent of the International Harvester Company of Canada, Hamilton Works, has resigned that important position, and will leave Hamilton to assume the position of general manager of one of the largest industrial manufacturing concerns in the United States, with their works in Bridgeport, Conn., and branch factories in Canada and England.

Mr. Biggert's appointment to a very important industrial position in the United States is very flattering to himself and associates.

The Chicago executive of the International Harvesters made the announcement of his resignation and expressed their regret at losing his valuable services.

Mr. Biggert is of Canadian ancestry, his grandfather moving from Connecticut to Hamilton many years ago, and Mr. Biggert's father was born in this city, the family in turn leaving here in 1849 for Wisconsin, where Mr. Biggert was born and spent his early boyhood.

HENRY H. BIGGERT,

for seven years general superintendent of the Hamilton works of the International Harvester Company, who has resigned that position to become general manager of an American firm.

HOW OLD COUNTRY FIRMS ARE TURNING FROM WAR TO PEACE LINES

Special to CANADIAN MACHINERY

Hamilton, Ont.—"My visit to this district is chiefly to get in touch with manufacturers, agents, and importers; to obtain an adequate idea of the importance of the city and surrounding districts in an industrial, agricultural and business way; to obtain information regarding the district which will be of value to British firms who may propose to locate branch factories in Ontario after the war, and to discuss the encouragement of British trade in Ontario with importers and others who are desirous of doing so.

"It is generally known that Great Britain, despite its tremendous war burden for over four years, has made extensive preparation for what is known as the reconstruction period," said Mr. F. W. Field, British Trade Commissioner in Ontario, in an interview with CANADIAN MACHINERY. "The work has proceeded steadily and in a great number of directions. A federation of British industries, representing over $12,000,000 of capital, and likely to represent several times that amount, has been created to stimulate exports. On its executive council are representatives of many important firms and trade associations, such as the British Engineers' Association, the British Electrical and Allied Manufacturing Association, and the Association of British Motor and Allied Manufacturers. The British Manufacturers' Corporation, with a capital of $1,000,000 and a large membership, will be represented in most foreign markets. A metal bank has been authorized to assist the metal and chemical industries. The Government's Board of Trade has given important assistance to the dye industry. An extensive organization, including over 80 committees, has been created under the Minister of Reconstruction. Great attention is being given to scientific research.

"What is being actually done in the United Kingdom in the turnover of factories from war to peace purposes was recently outlined by Mr. F. G. Kell, parliamentary secretary to the Minister of Munitions. For example, in the munitions area of Hebburn-on-Tyne, a firm, previously engaged on the manufacture of aeroplanes, is turning over to the manufacture of heavy toys and furniture, giving employment to 500 people. A Newcastle-on-Tyne firm, from producing aeroplanes, is turning over to household furniture making, and will give work to 500 people. A firm at Burnley, which was manufacturing fuses, is turning over to the manufacture of electrical fittings. At Leigh, in Lancashire, a firm is going to produce presses for brick-making, and it is estimated that they will employ about 1,000 persons. A Sheffield firm is turning over from the manufacture of shells to files and springs, and expect to employ 1,000 hands. At Leeds, one firm will cease to make steel pressings for mines and copper bands for shells, and make dairy utensils, while another, which was engaged in assembling aeroplanes will devote its buildings to the making of iron valves as an adjunct to their brass valves department. One Birmingham firm is changing from the production of fuse components and aeroplane parts to the manufacture of motor accessories, and another firm from aeroplane parts to capstan lathes. At Matlock a firm is arranging to manufacture cream separators, which are now largely imported from Sweden and America.

"Three munition firms at Leicester, Ilkeston, and Nottingham are taking up the manufacture of hosiery needles, which in pre-war days were practically entirely imported from Germany, and they hope to turn out a million, and later on two millions a week. Three Loughborough firms are devoting themselves entirely to the manufacture of hosiery needles, heretofore imported from Germany. A Leicester firm, which before the war was engaged in importing type writers and selling and repairing them, now propose to manufacture them. Another firm in the same town which formerly made vulcanite pressings for magnetos will now make fountain pens, which were imported from America before the war. A third Leicester munition concern is laying out a plant for producing hose-suspender fittings, which also in pre-war days were almost wholly imported from Germany.

"Two other firms in the same town are going to manufacture corset steel and wood wool from old pit props. The latter occupation will be conducted in the foundry where iron shells were cased for the war. Then there are several cases where manufacturers who were producing aero engines are going to make engines for motor cars, and another firm of a similar character is going to turn out motors for small launches. In another case a firm is changing from tank and shell making to making boot machinery, and in South Wales, tin can firms are in a position to begin civil

Continued on page 65

J. Melville Alison, London manager for the well-known firm of Cotton Transmission Rope Manufacturers, William Kenyon & Sons, Ltd., Manchester, England, is again due in Canada to interview business friends in the Cotton, Flour, Paper and Steel Mills. It is many years since Messrs. Kenyon commenced doing business in Canada. Mr. Alison, we understand, will stay at the Windsor Hotel, Montreal, and Chateau Frontenac, Quebec

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

London.—The formation here of one of the greatest electrical combines in the world, to be known as the English Electric Company, with a capital of $25,000,000, and employing 25,000 persons, is viewed as a British effort to obtain ascendency in a market in which the Germans, as well as the Americans, have hitherto offered the most serious competition. One of the largest manufacturing concerns in this country, which has been one of the greatest producers of war materials, contemplates the manufacture of typewriters on a scale sufficient to be a serious competitor in the world market, where American manufacturers have had the monopoly.

Ottawa.—The annual general meeting of the Engineering Institute of Canada opened at Ottawa on February 10th, attended by engineers from all parts of the Dominion. The professional meeting followed the general, at which a number of engineering and national topics were discussed. A number of the leading engineering bodies of the United States were represented, and addresses were delivered by these representatives: Comfort A. Adams, president of the American Institute of Electrical Engineers: A. D. Flynn, secretary of the United Engineering Council of New York; and Doctor Ira Hollis, past president of the American Society of Mechanical Engineers.

MARINE

Collingwood.—The steamship "Atikoken," now lying at the yard of the Collingwood Shipbuilding Co. at Kingston, has been sold for trade on the Atlantic coast, and will be taken from Kingston down the St. Lawrence as soon as navigation opens. The "Atikoken" is owned by the Montreal Transportation Company.

Vancouver, B.C.—The New Westminster Construction Co. expect to launch the first of their 1,500-ton wooden steamers, built to the order of the French Government very shortly. The hull of this vessel is well advanced, but she is waiting for the tail shaft to arrive. Some delay has been caused on these vessels by the change in engine design made by the French Government since the contract was let. The fifth vessel will be laid down on the berth vacated by the first as soon as she is launched, while the other three are well advanced.

Ottawa.—The four wireless finding stations installed by the Department of Naval Service during the war at Cape Sable, Halifax, Cape Canso and Cape Race, have been placed at the disposal of merchant shipping since the signing of the armistice. They are originally installed with their special finding apparatus for the purpose of locating enemy craft fitted with wireless. Now their usefulness will be in giving a bearing to vessels caught in fog in the vicinity of the coast, within a radius of several hundred miles; thus lessening the anxiety of those in charge, and probably preventing many casualties.

Vancouver.—The president of the Montreal Harbor Commission, speaking at Vancouver recently, emphasized the natural advantages enjoyed by the port. He told a joint meeting of the Board of Trade and the British Columbia Manufacturers' Association that if they went down East and saw what had been developed from the natural advantages there, they would come back to Vancouver and go crazy with enthusiasm when they realized the advantages that they possessed. As a result the meeting passed a resolution to be forwarded to Ottawa, urging the immediate development of Vancouver harbor.

Ottawa.—A deputation from Toronto waited on Sir Thomas White for the purpose of urging the Government to place some of their contracts for ships with Toronto firms. The deputation was representative of many interests, including the City of Toronto, Toronto Harbor Board, Board of Trade, the shipbuilding plants, Machinists' Union, G.W.V.A., and the Toronto Trades and Labor Council. Sir Thomas White took the position that there were two aspects of the question to consider, namely, whether the Government, as a matter of policy, should extend its programme, and whether the cost would be such as to justify giving further contracts. He claimed that there had been no discrimination in giving contracts, and made the point that the ships built for the Imperial Munitions Board were financed by the Canadian Government.

Goderich.—Speaking of business conditions at Goderich, a recent despatch from that place says: "The National Shipbuilding firm is running at top speed turning out marine engines and boilers for the American and French Governments, and has many positions open for mechanics. It is also receiving many enquiries for repair parts of the engine which it manufactures, but has been compelled to refuse orders because of the shortage of mechanical workers. 'We are carrying night and day shifts,' said Mr. Peter Gorrie, the secretary-treasurer, 'and have enough work to keep us going for a year at least. Just now we are engaged on fourteen marine engines for the French Government and the Emergency Fleet Corporation, and have many more orders on hand. We are very optimistic, and have a big field for our products.' Regarding the employment of returned soldiers, Mr. Gorrie stated that the firm would be very pleased to give them preference. There are a number of veterans working in the plant at present, and they are giving the utmost satisfaction."

MUNICIPAL

Toronto.—The chief of the Fire Department is asking for three motor combination hose, chemical and pump trucks, one motor 75-foot aerial ladder truck, and one 55-foot aerial ladder truck, which are estimated to cost $76,600.

PERSONAL

G. Harris has been appointed sales manager of the Chapman Double Ball Bearing Co., Ltd., Sorauren Ave., Toronto, in place of John Reekie, who has resigned to take up other duties.

W. D. Anderson, engineering and efficiency expert, has opened an office at 380 Queen St. W., Toronto. He makes a specialty of installing efficiency methods in industrial plants, the work being done by practical men who thoroughly understand the subject. Some lines taken up are scientific management, organization, time study, bonus, time, cost and stores systems, routing of work, etc.

TENDERS

Welland.—The Public School Board of the City of Welland are asking for plans for a proposed new school building to contain eight rooms. Plans and estimates will be received up to March 17th by J. McGaw, secretary of the Public School Board, Welland.

Toronto.—Sealed tenders will be received until noon on Friday, the 28th of February, for taking down the old Court House, Gaol, etc., at Sault Ste. Marie, and for the excavations and the erection of foundation walls of new Court House at Sault Ste. Marie, Ontario. Plans and specifications can be seen at the Sheriff's Office, Sault Ste. Marie, and at the office of H. F. McNaughten, Secretary of Public Works, Toronto.

Toronto.—Tenders will be received up to noon on February 24th for the building of a substructure of a bridge over the River Mattagami, near Timmins, Ont. Plans, specifications and general conditions of the contract may be seen at the office of C. H. Fullerton, superintendent of Colonization Roads, Parliament Buildings, Toronto. A marked cheque for $1,000 must accompany the tender. Tenders to be addressed to Hon. G. H. Ferguson, Minister of Lands, Forests and Mines, Ontario.

TRADE GOSSIP

January's building permits in Kitchener were $99,000.

Kemptville, Ont., may put in waterworks this year.

Hamilton's garbage collection system may be motorized.

Brantford bricklayers are going to get 70 cents per hour.

The County Council of Gray will spend a large sum for road machinery.

Central heating plant may be built with a housing scheme in Winnipeg.

Canadian Steel Foundries at Welland, owing to the present market, has closed the rolling mill.

Ottawa has deputations almost every day from all over the country asking that public works be taken up.

To Build Bridge.—A bill has been introduced into the New York Legislature in connection with the building of a new bridge between Bridgeburg and Buffalo. The American and Canadian Federal Governments will be asked to co-operate in this, and if this fails, an effort will be made to get the Ontario and New York State Governments to take the matter up.

Toronto.—The site of the new Anatomy Building and the Electrical Engineering Building is being cleared, and the buildings themselves, which were recently authorized by the Provincial Government, will be started immediately. The Government has made a grant of $350,000 for the Electrical Engineering Building, and $200,000 for the Anatomy Building, which is being built as an addition to the present Medical Building.

Going to Europe.—The Hydro-Electric Power Commission's mission to Europe to investigate the advancement of electric science left London for New York last week. The mission will be headed by General Manager E. V. Buchanan of the City of London Public Utilities Department. The mission will sail from New York on the "Baltic," and during their trip they will visit Great Britain, Sweden, France, Switzerland, and probably Italy.

Larger Export Possible. — Articles which Japan imports in large quantities and which could be advantageously supplied by Canada are suggested by Canadian Trade Commissioner A. E. Bryan as follows: Malt, confectionery, wine and liquors, condensed milk, sole leather belting, animal bones, carbolic acid, caustic soda, soda ash, dynamite, printing paper and good writing papers, asbestos, gypsum, pig iron and steel manufactures of all kinds, iron nails, rails, machinery of all kinds, tarred papers.

At Lyons Fair.—Canada is to be well represented at the great industrial fair at Lyons, which opens on March 1st and lasts for fifteen days. The Canadian Government, through the Department of Trade and Commerce, has made extensive arrangements for the Canadian exhibits. All Dominion exhibits will be shown in one group, thus making a large and impressive show. The Government itself is making a small exhibit of agricultural, mining, fishery and forestry subjects. The exhibits will be removed to Italy after the Lyons fair.

Sold the Plant.—The Imperial Munitions Board, following their policy of selling their plants, announce the sale of Camp Mohawk, Deseronto, to Frank Anglin, W. S. Anglin, and Frank and Charles Anglin, of the firm of S. Anglin and Co., of Kingston. There are two and a quarter million feet of lumber in the

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camp, which the purchasers acquire, as well as the heating plant. The Board has also announced the sale of the summer camp at Deseronto to W. S. Anglin, which includes about three-quarters of a million feet of lumber, as well as heating plants, etc.

Amherstburg Plant.—The plant of the Brunner Mond Co. at Amherstburg is almost completed, and some of the departments are already finished and ready to begin operations. The plant has been built at a cost of nearly $15,000,000, but operations are being held up owing to the unsettled business situation. The money invested in the company is largely American, and the double income tax is probably one of the unfavorable conditions, while the fear of drastic revision of the Canadian tariff is also acting as a hold-back.

CATALOGUES

The Gishoit Machine Company, Madison, Wis., have recently issued a circular descriptive of the Perionograph time and labor saving device for the obtaining of accurate factory costs.

The Lansing Stamping & Tool Co., Lansing, Mich., has sent out trade literature telling of the value of the Internal grinder in fast munition work, and showing in a realistic manner just how important these machines have been.

The H. Mueller Mfg. Co., Sarnia, Ont., have in the course of preparation a 300-page catalogue on water, gas and steam brass plumbing goods. This catalogue is at present in the printer's hands and will be ready for distribution within a few weeks.

The Howard Iron Works, Buffalo, N.Y., has issued a catalogue on their Howard expansion joint. The catalogue is descriptive of the various types of expansion joints made by this firm, and illustrations show the features of each type.

The Swedish Gauge Co., 10 Cathcart St., Montreal, have issued an attractive calendar for 1919, indicative of the Johannsson method of gauging. The illustration features an excellent halftone engraving showing a typical set-up in the tool room.

The Webster & Perks Tool Company, Springfield, Ohio, have issued a very attractive catalogue on the pointing, thread cutting and special tapping machinery which they manufacture. This catalogue features the various types of tapping machinery manufactured, and also a number of other products.

The Canadian S.K.F. Co. have recently issued two pamphlets descriptive of the quick acting automatic drill chuck which they manufacture. The unlimited holding power and the perfect centering features of the S.K.F. drill chuck make its use most desirable with high speed drills, and the ease with which drills can be changed adds to its value in the machine shop.

The T. R. Almond Mfg. Co., Ashburnham, are sending out a catalogue descriptive of their line of drill chucks, scroll chucks for lathe use, and other equipment which they manufacture. This catalogue is put out in such a manner that the loose leaves of which it is composed may be incorporated into a standard price book.

The Ohio Blower Co., Cleveland, Ohio, have issued a small pamphlet on their Swartwout vacuum traps, which gives considerable detail regarding the operation of its mechanism. The trap is described and the method by which a number of loose parts are eliminated is shown very clearly by means of a cross section. The principle on which the trap works is also very clearly explained.

The Tallman Brass and Metal Company, Limited, Hamilton, Ontario, have issued their new stock list, dated February 1st, of brass and copper rod, tobin bronze rod, phosphor bronze rod, bass and copper sheet, tubing, etc. This stock-list is unusually complete and lists a great variety of sizes in the articles mentioned above and a number of other products of the Tallman Brass and Metal Company such as sheet copper, finished brass goods, automobile trunks, and electric fixtures.

The Goldie & McCulloch Co., Galt, Ont., have recently issued a catalogue on rotary jet condensers and vacuum pumps. This firm have obtained the rights to the Rees-Roturbo pumps and condensing equipment, and this catalogue deals with the various types of condensing equipment, which they are prepared to supply. Condensers in general are treated of. Condenser plant economies and the economy of high vacuum are shown. The Rees-Roturb jet condenser is treated of in detail, its design being gone into thoroughly, and features of installation being dealt with in very thorough manner.

The Heine Safety Boiler Company, St. Louis, Mo., have issued a new pamphlet called "Boiler Logic." As its name indicates this pamphlet of 86 pages is devoted to practical considerations arising out of boiler and boiler setting design. Part 1 is devoted to some fundamental considerations of boiler designs, such as furnace requirements and heat transmissions. Part 2 is devoted to practical baffling of waterproof boilers and various types of baffles, and their merits are fairly described. Part 3 takes up the Heine boiler and describes its operation for different fuels, firing, methods and practice of service. Part 4 deals with overload conditions.

The Goldie and McCulloch Co., Galt, Ontario, have issued a very attractive catalogue on the Rees Roturbo pump, for which they have secured the manufacturing rights for Canada. The Rees-Roturbo pump has proven highly efficient and is widely used in Great Britain, Canada, and the United States, and the high efficiency and self-regulating features proving particularly attractive. The literature, which has recently been published by the above mentioned firm, goes into the design of this pump very fully, and makes very interesting read-

ing, the fundamental principle of the pump itself is very clearly explained and the manner in which the problems connected with variation of head in either the suction or delivery are dealt with is clearly shown. The various types of single and multi-stage pumps are featured and dimensions and other information given concerning their design.

HOW OLD COUNTDY FIRMS ARE TURNING FROM WAR TO PEACE.

Continued from page 61

work immediately, but are prevented from doing so at present owing to the difficulty of obtaining supplies of tinplates.

"As an important factor in British trade and commerce, now that normal times are returning, is the Imperial Government's department from whom I receive my instructions, namely, the Department of Overseas Trade (Development and Intelligence). This department combines the commercial activities of the Foreign Office and the work of the former commercial intelligence branch of the British Board of trade. Under this department will soon be working sixteen trade commissioners in the British Empire. They are the commercial representatives of the Motherland in the overseas Dominions, etc. In Canada, three, and probably four, will be stationed, two already having taken up their posts.

"The supply of materials to manufacture in the United Kingdom is such that domestic control can now be considerably relaxed, and it is anticipated that British manufacturers will immediately commence to build up again their vast export trade with markets abroad.

"The general sentiment, as you know, is strongly in favor of closer commercial ties between the various units of the British Empire. In Ontario, where I represent the British Government's Department of Overseas Trade, there are substantial signs that when the people of Ontario propose to purchase goods outside their own country they will endeavor to learn first with what Great Britain and other parts of the Empire can furnish them, and the manufacturers of the Empire generally are expected to take similar interest in other sections of that Empire," concluded Mr. Field.

PHILADELPHIA.—With the establishment of prices for Virginia iron, it is only 20 cents higher at Philadelphia than eastern Pennsylvania iron when quoted on a Pittsburgh basis. The meeting of the Eastern and Virginia pig iron associations here last week studied the situation thoroughly, and it was found that all eastern Pennsylvania furnaces are adhering to $31 Pittsburgh base. Sales of foundry iron have amounted to roughly 2,000 tons during the week, including one transaction of 300 tons for second half delivery. Inquiries for export include 3 000 tons for China, several thousand tons basic, 5,000 tons bessemer and considerable foundry, but the indications are that these will remain just enquiries for some time yet.

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The Financial Post
THIS WEEK
ON
STEEL MARKET CONDITIONS

SOME of those who are very close to the market claim that the present situation at the peace conference is a factor that keeps buyers from coming into the market. It does not require a very great amount of reasoning to see that there is a lot of steel needed in every country that has been at war. The disturbing reports that are coming out regarding the feeling in Germany, the planning of a new conscript army there, the attitude of some of the Allies, and the new armistice arrangements all tend to keep an element of uncertainty and doubt in the mind of the people that hinders planning and buying for anything except immediate wants.

LABOR

The suggestion is being made more in the open now than ever before that wages on their present level are doing much to keep business from moving. As has been stated before, the Steel Corporation, when they made their reduction which averaged $4 per ton, stated that it was their concession, regardless of labor costs. Now the claim is that any other reduction will come only when labor costs are cut. Naturally those who hold these views, and they are many, speak rather gingerly on the subject, fearing that anything they may say will cause unrest or open trouble in the dealings between the mills and the men.

Besides the important article from which the above quotations are made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

Expenses Cut Into Profit of London Rails.
Asbestos Corporation at $1,253,813 Gains 123 Per Cent.
Hollinger Mines Have Built Up Strong Reserve.
United Company Plans to Purchase Railway Hote's.
Taking Steps to Provide Against Smooth Crooks.
England Looks to Canada For Ore.
British Banks Are Increasing Their Capital.
National Trust Company Shows New High Record.
The Tariff—R. MacKenzie Replies for Farmers to Manufacturers.
Business in Bond Market is Favorable.
Northern Life Passes Through a Trying Year.
New Municipal Act Before B. C. Legislature.
Saskatoon Has Raised Its Rate on Improvements.
Building During January Proved Disappointing.
Provincial Paper Mills Profits Less.
Employers Try to Maintain Wage Standards.
London Life Has $60,000,000 on its Books.
Great West Life Wrote Thirty Millions.
Government Paid Damage of Explosion.
Declining Days of Canada's Food Board Regime.

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C.M.

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

FOR SALE

ONE 3 16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

WANTED—BULLDOZER (USED), MEDIUM size. Drilling machine, 4-spindle, straightling, No. 4 Morse. 7' or 8' between outside spindles. Both must be good. Box 554, Canadian Machinery. (c8m)

COMPLETE WELDING OUTFIT, MUST BE IN first-class shape. Prest-O-Lite preferred. Send price and particulars to F. Clark, 95 Woodland Ave., St. Catharines. (c9m)

POSITION WANTED

Practical Mechanic having successfully held positions as foreman pattern maker and general foreman all depts., thoroughly familiar with foundry practice, molding machines and latest labor-saving devices, desires position as Superintendent with firm manufacturing agricultural implements or general contract shop, that offers greater opportunities for advancement than present position offers. Salary desired, $3,000 per year and percentage on turnover.

Can organize new shop or doctor sick one; able to design jigs and dies to speed up production. Box 555, Canadian Machinery. c8m

POSITIONS WANTED

FORGE AND DROP HAMMER SUPERINTENDent will be open for a position shortly. Experienced in drop hammer and machinery blacksmithing, upsetting, bulldozers. Long experience in all classes of forge work. Can design dies and harden them. Box 552, Canadian Machinery. (c9m)

FIRST-CLASS STEAM, ELECTRICAL ENGINeer open for position. Thoroughly experienced with various types of engines, boilers, pumps, air compressors and electrical machinery. Address, Box 556, Canadian Machinery. (c8m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

WANTED

WANTED—FENCE FOR INDUSTRIAL PLANT, approximately eight feet high and nine hundred yards long. Send full particulars, and where can be seen, to Box 557, Canadian Machinery. (c9m)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $300.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 3½" Engine Lathe x 10'. Flather. Price, $350.00.

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, Montreal, P.Q.
(ctfm)

Wanted immediately, **Heavy Duty Lathe**, new or used, good condition, ranging from 40" to 48". Swing, about 25 ft. between centers. Arranged for Motor Drive.

CANADA FORGE CO.'S PLANT,
Welland, Ont.
(ctfm)

MACHINERY

NEW AND SLIGHTLY USED

14—16" x 6' South Bend double back geared lathes.
5—16" x 6' South Bend single back geared lathes.
1—10" x 36" Norton grinder.
1—No. 2 Ford-Smith plain miller.
1—16" x 22" x 8' Sebastian gap lathe.
50 and 75 H.P. Motors.
1—340 cubic ft. Rand Compressor, Aftercooler and Receiver, belt, and 5" pipe.
New Transmission material of all kinds.
12—Racine hack saws.

Cuts, detailed descriptions and prices on application.

ELGIN MANUFACTURING CO., LTD.,
St. Thomas, Ont.
(c11m)

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

FOR SALE

In good condition, High-Speed Ball-Bearing Drill Presses, Floor and Bench type, 1, 2 and 3 spindles; Garvin and Rickert Shafer, Tapping Machines; 6 1½" Model A Cleveland Automatics. Attractive prices.

P. W. Ellis & Co., Ltd.

St. Clair Works:

St. Clair Ave. and Prescott St., Toronto

c8m

IMMEDIATE SHIPMENT

LATHES.

12″ x 5′ LEBLOND, standard.
14″ x 6′ McKENZIE, standard.
14″ x 8′ LEBLOND Toolroom Equipment.
14″ x 7′ HENDEY Toolroom Equipment.
6—16″ x 6′ C.M.C. double back gear, quick change gear.
18″ x 6′ CISCO, double back gear.
19″ x 10′ LEBLOND heavy duty.
22″ x 10′ REED PRENTICE, geared head.
12—26″ x 12′ C.M.C. double back gear, quick change.
28″ x 10′ CONRADSON geared head.
36″ x 14′ NEW HAVEN triple geared.
24″—40″ x 20′ McCABE, double spindle.
28″—44″ x 14′ BERTRAM gap lathe.
20″ x 36″ x 14′ CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15″ McKENZIE B.G. crank.
16″ RAE B.G. crank.
16″ STEPTOE crank.
20″ GOULD & EBERHARDT high duty.
24″ and 28″ GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7HS Lincoln type.
No. 1½ AMERICAN plain.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool.
No. 2 OAKLEY Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10″ MYERS bench sensitive.
10″ McKENZIE sensitive.
14″ MYERS column sensitive.
14″ PERFECT column sensitive.
15″ BARNES lever feed.
20″ BARNES back geared.
22″ BARNES sliding head.
26″, 28″ and 34″ BARNES sliding head.
26″ and 28″ BARNES with tapper.

RADIALS.

2′ FOSDICK National pattern.
3′ NILES box table.
4′ CINCINNATI-BICKFORD, speed box drive.
5′ BICKFORD variable speed motor drive.
5′ LONDON box table.
5′ FOSDICK heavy duty speed box and tapping attachment (new).

PLANERS

24″ x 24″ x 7′ LONDON heavy pattern.
30″ x 30″ x 8′ BERTRAM, one head.
36″ x 36″ x 12′ BERTRAM, one head.
42″ x 42″ x 10′ McGREGOR GOURLAY, heavy pattern, 2 heads.

MISCELLANEOUS.

No. 2 BAKER Keyseating machine.
No. 2 MITTS & MERRILL Keyseating machine.
8″ JARECKI pipe threading machine.
4″ MERRILL pipe threading machine.
1½″ WELLS bolt cutter.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED

64 FRONT ST. W. - - TORONTO

WANTED TO PURCHASE

SECOND-HAND FACE LATHE, in good condition, 84 inch Face-plate, with tail stock, and one or two rests. Give name of maker and all particulars. Swedish Steel & Importing Co., Ltd., 53 Canadian Express Building, Montreal Que. tc8m

USED

MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12′-0″
1 "Curtis" air hoist 8″x4′-0″
1 "Matheson" hydraulic press 14″x24″
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.

Builders of Machinery

New Glasgow, Nova Scotia

tf

Below is a list of valves and fittings used in connection with pumps, accumulators and shell presses, all of which are in first-class working order:

The following suitable for 1,500 lbs. working hydraulic pressure:—

3—4″ flanged, By-pass Valves, steel body (R.D. wood).
7—3″ flanged, By-pass Valves, steel body (R.D. wood).
5—3½″ flanged, By-pass Valves, steel body (Dean and Steam Pump Co.).
3—3″ screwed ends, By-pass Valves, brass body (R.D. wood).
7—3½″ flanged ends, Shock Relief Valves, steel body (R.D. wood).
5—3½″ screwed ends, Check Valves, steel body (R.D. wood).
8—3″ screwed ends, Check Valves, steel body (R.D. wood).
4—4″ flanged ends, Check Valves, steel body (R.D. wood).
3—3″ screwed ends, Check Valves, brass body (R.D. wood).
12—4″ flanged ends, Balance Stop Valves, steel body (R.D. wood).
2—6″ flanged ends, Balance Stop Valves, steel body (R.D. wood).
6—3½″ flanged ends, Balance Stop Valves, steel body (R.D. wood).
20—3″ screwed ends, Balance Stop Valves, brass body (R.D. wood).
2—3½″ screwed ends, Balance Stop Valves, brass body (R.D. wood).
5—2″ screwed ends, Balance Stop Valves, brass body (R.D. wood).
1—6″ flanged ends, Balance Stop Valves, steel body, NEW (R.D. wood).

The following suitable for 250 lbs. working water pressure:—

6—4″ Pratt & Cady, screwed ends, Horizontal Flapper Check Valves, iron body.
2—4″ Pratt & Cady, flanged ends, Horizontal Flapper Check Valves, iron body.
3—5″ Jenkins, flanged ends, inside screw, Gate Valves, iron body.
3—4″ Jenkins, flanged ends, inside screw, Gate Valves, iron body.
2—5″ Crane Co., flanged ends, inside screw, Gate Valves, iron body.
4—4″ Crane Co., flanged ends, inside screw, Gate Valves, iron body.
7—3½″ Crane Co., flanged ends, inside screw, Gate Valves, iron body.
3—3½″ Jenkins, flanged ends, inside screw, Gate Valves, iron body.

The following suitable for 125 lbs. working water pressure:—

6—5″ Pratt & Cady, screwed ends, inside screw Gate Valve, iron body.
1—5″ Pratt & Cady, flanged ends, inside screw, Gate Valve, iron body.
2—5″ Jenkins, screwed ends, outside screw, Gate Valves, iron body.
5—4″ Crane Co., screwed ends, outside screw, Globe Valves, iron body.
8—4″ Kennedy, screwed ends, inside screw, Gate Valve, iron body.

Cast Iron, Cast Steel and Steel Forging Elbows, Tees and Flanges, suitable for water pressures 125, 250 and 1,500 lbs.

Canada Foundries and Forgings, Limited (Canada Forge Plant)

WELLAND, ONTARIO

NOTICE

New and Slightly Used Equipment Must be Sold Immediately

MOTORS

25 CYCLE, 3 PHASE

No.	H.P.	VOLT.	R.P.M.	MAKE
4	250	2200	480	Westinghouse
1	200	2200	480	C.G.E.
1	150	2200	750	"
1	250	550	480	Westinghouse
2	200	550	480	"
3	200	550	480	"
1	150	550	480	" Slip-Ring
1	100	550	480	C.G.E.
1	75	550	480	Westinghouse
4	50	550	720	"
3	40	550	720	"
1	30	550	720	"
1	20	550	720	"
2	15	550	720	"
3	10	550	720	"
2	5	550	720	"
5	125	220	720	Cr. Whl.
2	30	220	720	Westinghouse

60 CYCLE, 3 PHASE

No.	H.P.	VOLT.	R.P.M.	MAKE
1	150	2200	600	C.G.E., Slip-Ring
2	75	2200	690	Westinghouse
1	150	550	600	C.G.E., Slip-Ring
1	75	550	690	Westinghouse
1	75	550	850	"
1	50	550	690	"
1	50	550	850	"
1	50	550	1200	C.G.E.
2	35	550	900	" Slip-Ring
1	35	550	1200	" Slip-Ring
1	30	550	1140	Wagner
1	20	550	1200	C.G.E.
1	10	550	1800	C.G.E.
2	5	550	1140	C.G.E.
1	40	220	1140	Westinghouse
1	30	220	1140	"
1	20	220	1140	A.C.B.
1	10	220	1140	Westinghouse

CAN SUPPLY TRANSFORMERS FOR THESE MOTORS

Lathes, Milling Machines, Air Compressors, Receivers, Shapers, Drill Presses, Etc.

Write or wire for prices

Send us your list of equipment for sale

E. A. LOWRY POWER EQUIPMENT CO.

GUELPH - - - - - CANADA

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M.. 2
60	H.P.,	550	VOLTS,	450	R.P.M. ...1
15	H.P.,	550	VOLTS,	1,200	R.P.M.. 1
10	H.P.,	550	VOLTS,	720	R.P.M. 1
7½	H.P.,	550	VOLTS,	720	R.P.M... .1
7½	H.P.,	550	VOLTS,	1,800	R.P.M. .1
5	H.P.,	550	VOLTS,	720	R.P.M.. .1
5	H.P.,	550	VOLTS,	900	R.P.M.. .1
5	H.P.,	550	VOLTS,	1,150	R.P.M.. .1
5	H.P.,	550	VOLTS,	1,200	R.P.M.. .3
3	H.P.,	550	VOLTS,	1,200	R.P.M. ..2
2	H.P.,	550	VOLTS,	1,200	R.P.M.. 2

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550TRANSFORMERS, POLE TYPE $\frac{220}{110}$ VOLTS
5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Zenith Coal and Steel Products
LIMITED

402 McGill Building Montreal

PARTIAL LIST OF TOOLS

10' Bement Vertical Boring Mill, two heads.
36" Bausch Vertical Boring Mill, two heads.
48" x 48" x 12' D. & H. Open-side Planer, one head on rail, one on side.
36" x 36" x 10' Gray Planer, two heads.
3 36" x 36" x 8' Gray Planers, two heads.
36" x 36" x 8' Hamilton Planers two heads
30" x 30" x 10' Bement Planer two heads
1—No. 2 Kempsmith New Universal Miller
5—No. 0 Steptoe Hand Millers.
2—3" x 36" Jones & Lamson, geared head.
13" x 5' 6" New Carroll-Jamieson Quick-change Lathe.
14" x 6' New Carroll-Jamieson Quick-change Lathe.
15" x 6' New Sidney D.B.G. Quick-change Lathe, swing 17"
12- 17" x 8' New National Quick-change Lathe.
3 -17" x 8' New Sidney D.B.G. Quick-change Lathe, swing 19".
18" x 24" New Rahn Larmon Lathe, D.B.G., quick change.
9—19" x 8' New Sidney D.B.G. Quick-change Lathes, swings 21".
24" x 20' Reed Lathe.
32" x 24' Fay & Scott Lathe, raising blocks to swing 53".
5' Bickford Single Pulley Drive Radial
4' Mueller Single Pulley Drive Radial.
2—20" Rockford High Duty Drills.
250-lb. New Little Giant Belt Hammer.
100-lb. New Little Giant Belt Hammer.
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

Grey Iron Castings

We are in an excellent position to give quick delivery on high grade castings up to 10,000 lbs. in weight. Send your Blue Prints for quotations.

Our up-to-date Pattern Shop can handle your Pattern Work expeditiously and well

Welland Machine & Foundries, Ltd., Welland, Ontario

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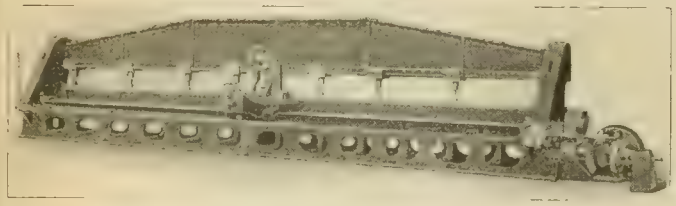
For Structural and Bridge Works, Tank and Boiler Works, Shipyards, Car and Locomotive Works and Railway Repair Shops



We build Plate Planers of any required size, arranged for belt or motor drive and equipped with pneumatic, hydraulic or screw jacks.

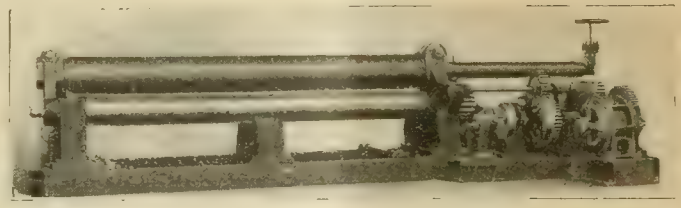
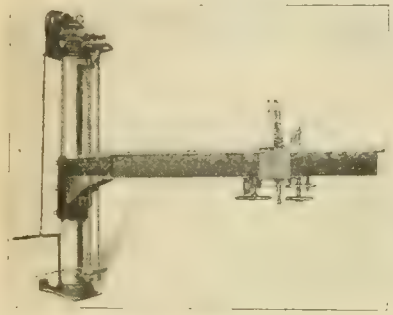
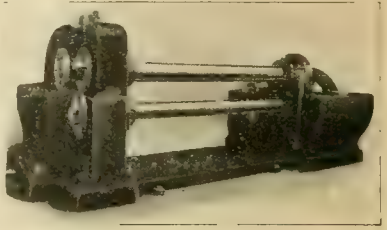


Plate Bending Rolls of any capacity and distance between housings and arranged for belt or motor drive can be furnished upon request.



Ryerson Boiler Shop Radial Drill is designed principally for the use of boiler makers, bridge and shipbuilders.



This machine is designed for straight shearing of sheets and plates and can be efficiently used for cutting round and square or flat bars.

IF YOU WANT

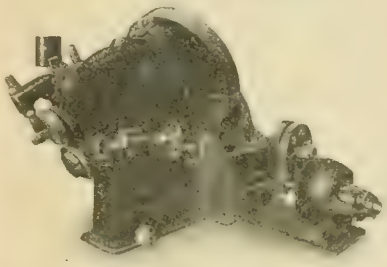
Machine Tools

NEW OR USED

Complete equipment for Railroad Spring Shops, Flue Shop Equipment or Machinery for any other purpose, or Woodworking Machinery of any kind

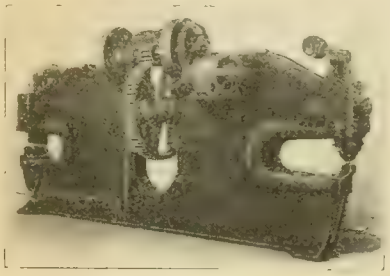
Write or Call on Us

Many of these machines in Toronto Stock

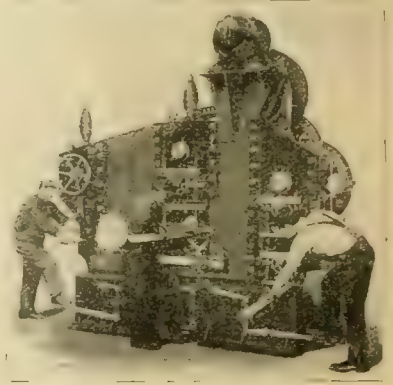


The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

No. 4 Ryerson High Speed Friction Saw for cutting Structurals, round and square bars.



We can furnish Cored Frame or Solid Frame, Single or Double End Punches and Shears of various capacities and depths of throats.



Ryerson Steel Frame High Power Quintuple Punching and Shearing Machine, built in different sizes and with various combinations.

Garlock-Walker Machinery Company, Limited

32 Front Street West, Toronto, Canada

TORONTO MONTREAL WINNIPEG

"Everything in Woodworking and Metal Working Machinery"

FOR SALE

All in Excellent Condition and at greatly reduced prices. Write TO-DAY.

100 "Avey" No. ½ Single Spindle Ball Bearing Drilling Machines

Bench Type, for speeds up to 12,000 R.P.M., also 30 Double Spindle of the same Machines

30 Henry & Wright No. A, Class B Column Type SENSITIVE Drilling Machines

15" Swing, Capacity up to ¾" holes

The above are part of the Equipment of the British Munitions Company plant, which also includes:

Lathes, Drills, Grinders, Furnaces, Punch and Shears, Milling Machines, Twist Drill Grinders, High Speed Hack Saws, Blowers, Compressors, Hydraulic Pumps, Motors, Arbor Presses, Bliss Presses, Oil Tanks, Electric Drills, and a very large number of Machine Tools.

Also supplies of all kinds, including Shafting, Hangers and Pulleys, Belting, Steel Lockers, Time Clocks, Trucks, Standard and Hydraulic Valves, Pipe Fittings and Packings, Tool Steel, Twist Drills, Milling Cutters, Taps, Files, and complete machine shop equipment.

Write NOW for further information and quotations

Williams & Wilson, Limited

320 St. James Street, MONTREAL, QUE.

TOOLS & STAMPINGS
We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.
HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St. HAMILTON
PAT APPLD FOR

National High Speed Cutters

(The Cutter that gives service)

Let me quote you on your next requisition

Drills

High Speed and Carbon

Immediate shipment and right price.

J. A. M. TAYLOR

Machine Shop Supplies

Main 786 318 Stair Bldg., Toronto

MACHINE TOOLS
FOR SALE

The equipment listed below contains several items that are new. All are available for immediate delivery.

LATHES

1 **New Sidney Lathe**—Double back gears; quick change gears; max. distance between centers 11′; max. swing over shears 27½″; taper attachment.

2 **Hamilton, O., Lathes**—Swing over shears, 20″ and 21″; max. distance between centers 4′ 4″; opened gears; double back gears; one has Independent chuck and one has one Independent and one Universal chuck; good condition.

1 **Sebastian Lathe**—Swing over shears, 15″; max. distance between centers, 5′ 6″; opened gear; single back gear; one Universal chuck; fair condition.

1 **Sebastian Lathe**—Swing over shears, 15″; gap 2″; max. distance between centers, 3′; opened gear; single back gear; one Universal chuck; fair condition.

1 **LeBlonde, H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 11′; opened gear; single back gear; fair condition.

1 **C.M.C. Lathe**—Swing over shears, 20″; max. distance between centers, 9′ 6″; taper turning attachment; quick change gear; double back gear; one Independent chuck; good condition.

1 **C.M.C. Lathe**—Swing over shears, 18″; max. distance between centers, 3′ 6″; taper turning attachment; double back gear; good condition.

4 **C.M.C., H.D. Lathes**—Swing over shears, 26″; max. distance between centers, 6′; two with and two without taper turning attachment; quick change gears; three with Independent chuck and one with Universal chuck. These lathes are new.

1 **Gleason Lathe**—Swing over shears, 24″; max. distance between centers, 3′; open geared; single back gear; fair condition.

1 **Cisco Lathe**—Swing over shears, 15″; max. distance between centers, 3′; quick change gear; single back gear; one Universal chuck; fair condition.

1 **Barnes Lathe**—Swing over shears, 18″; max. distance between centers, 5′; eight feed changes in apron of carriage; single back gear; one Universal chuck; good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; max. distance between centers, 26″; good condition.

1 **Bertram Lathe**—Swing over shears, 26″; max. distance between centers, 8′; taper turning attachment; quick change gears; double back gears; one Independent chuck; good condition.

1 **Pond Lathe**—Swing over shears, 38″; max. distance between centers, 9′; taper turning attachment; quick change gears; triple back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 30″; max. distance between centers, 16′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 12′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 4′; taper turning attachment; quick change gears; double back gears; one Universal and one Independent chuck; very good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 20″; max. distance between centers, 3′; taper turning attachment; quick change gears; double back gears; one Universal chuck; very good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; 3′ between chuck and carriage; one set drawn in collar near chuck; good condition.

POWER SAWS

5—Atkins power saws, each 14″ capacity; complete with pumps; fair condition.

DRILL PRESSES (Vertical)

1—Barnes, 18″; fair condition.
1—Bertram, 42″; fair condition. Adjustable table and vertical movement on drill carriage.

PLANER

1—London, 36″ x 36″ x 7′ 6″, table; good condition.

TURRET BORING MILL

1—Bertram, 34″; turret with five bars; 17″ between table and cross rail; new.

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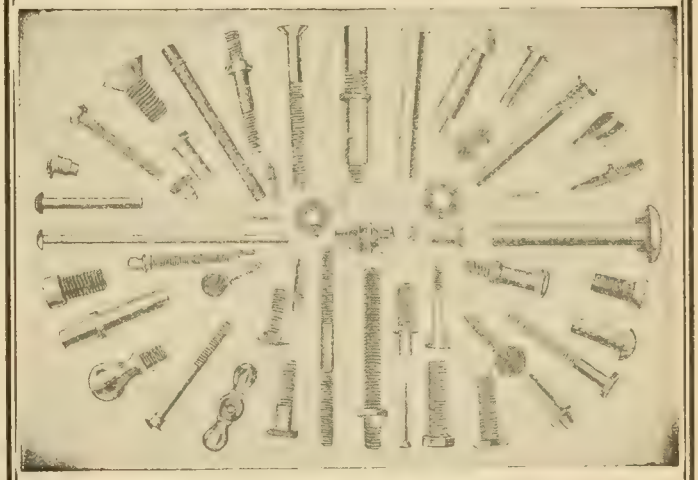

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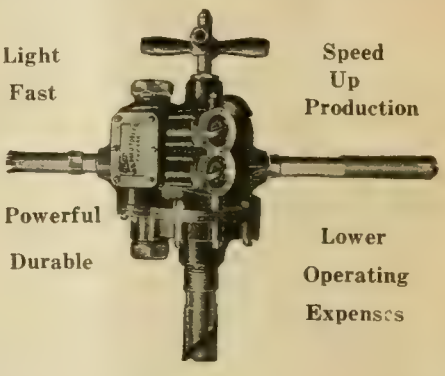

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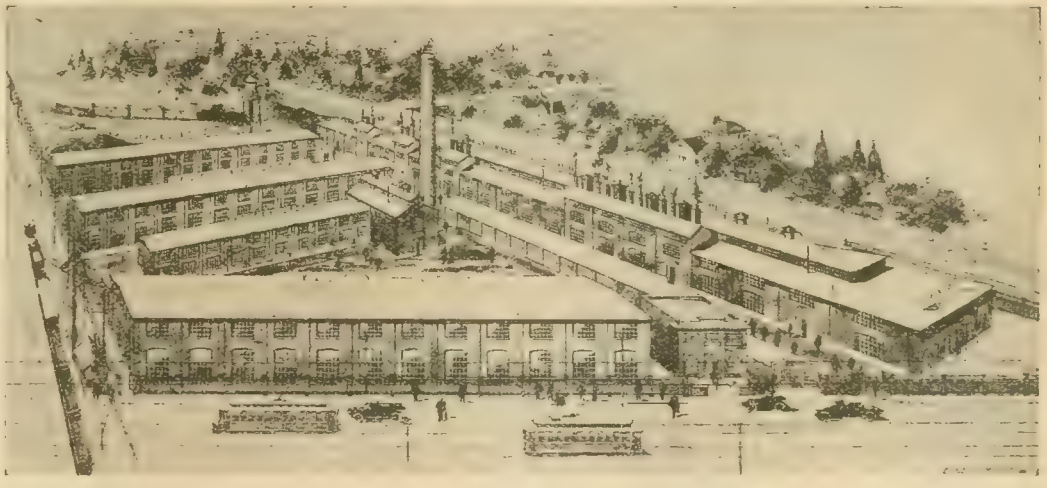

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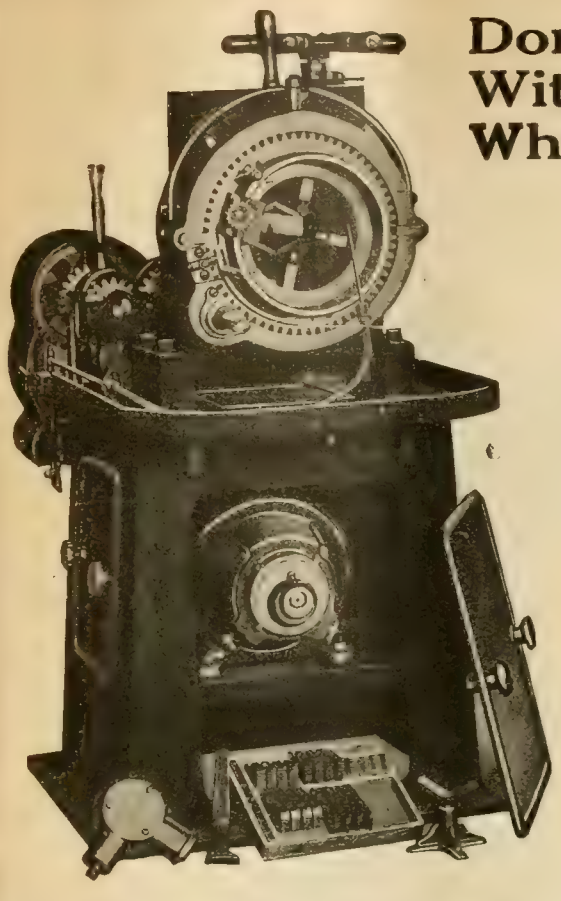

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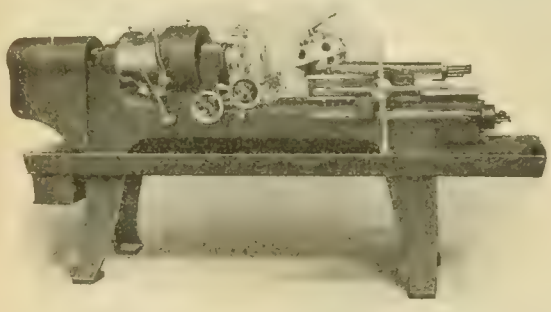

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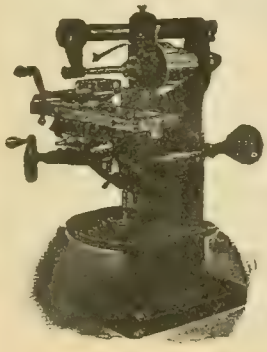

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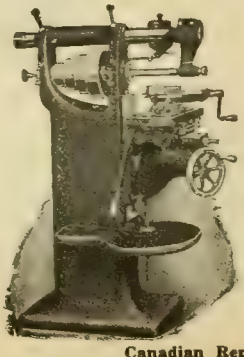

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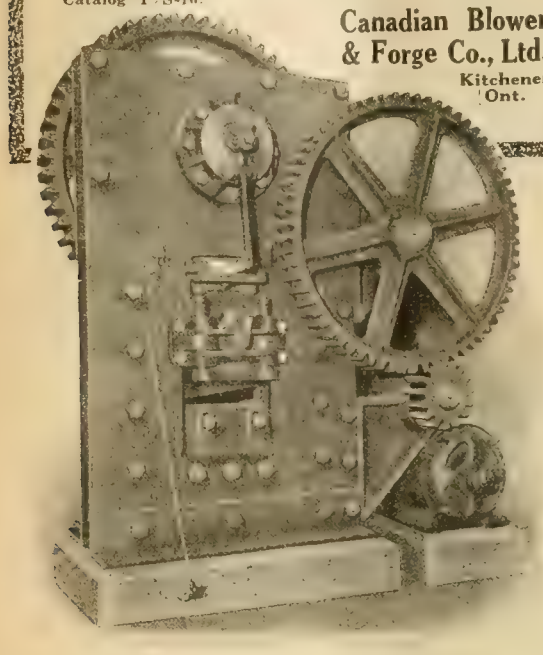

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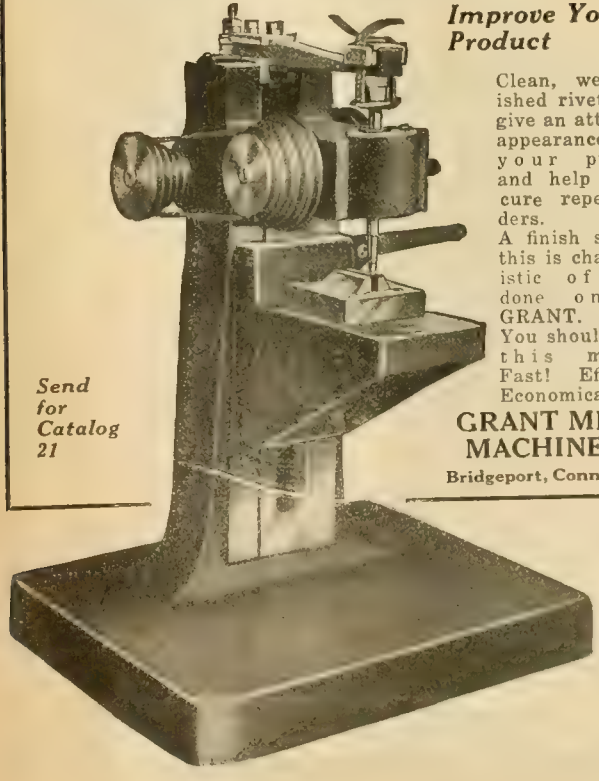

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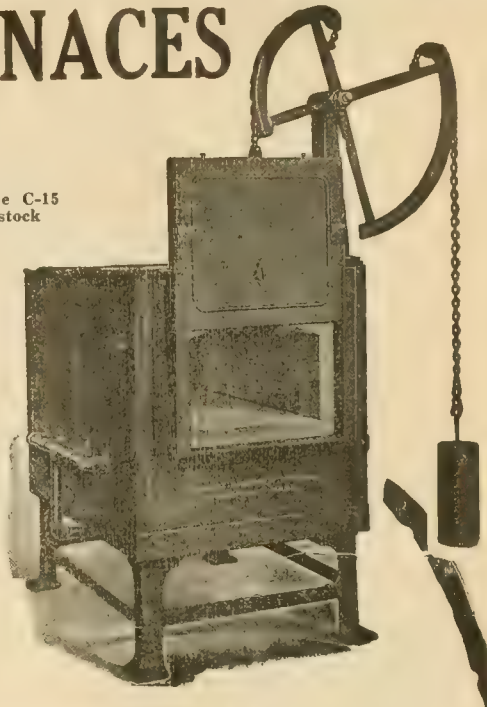

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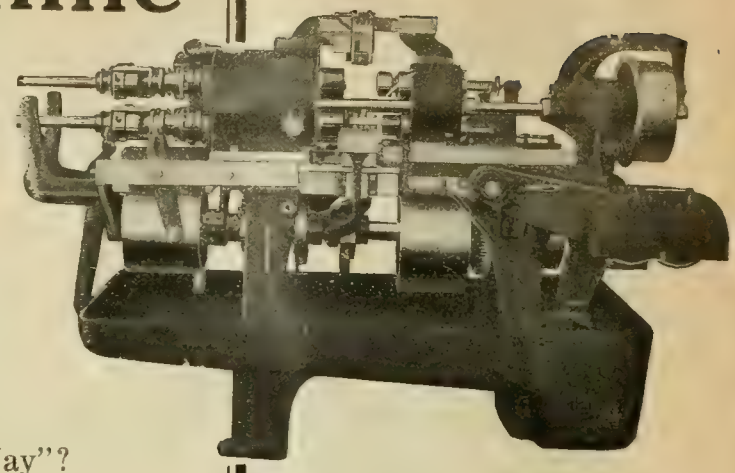

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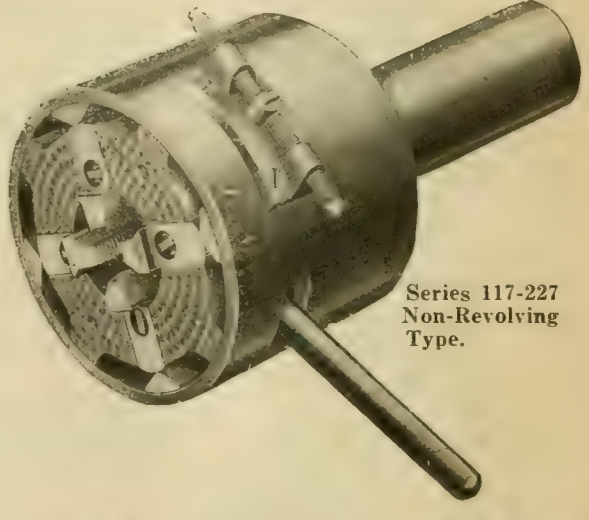

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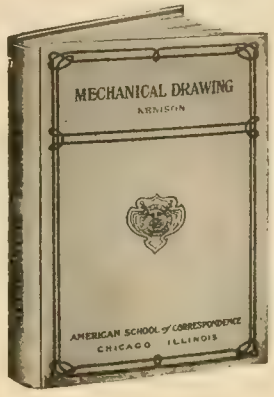

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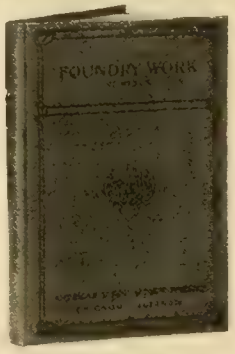

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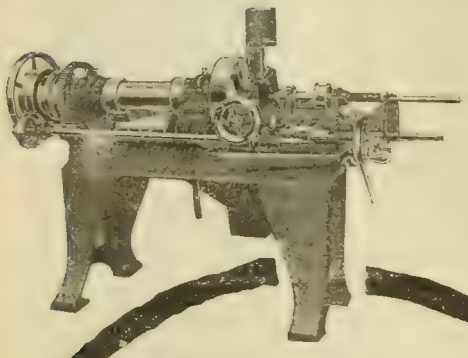

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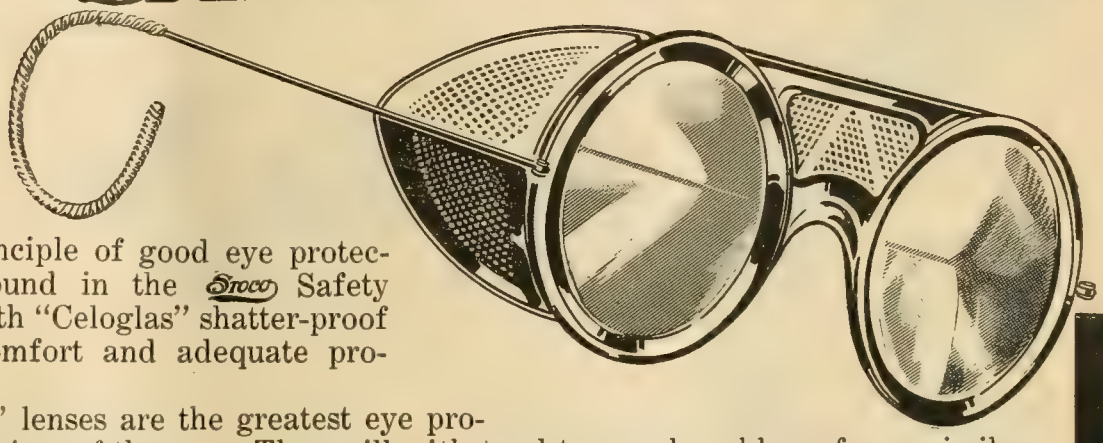

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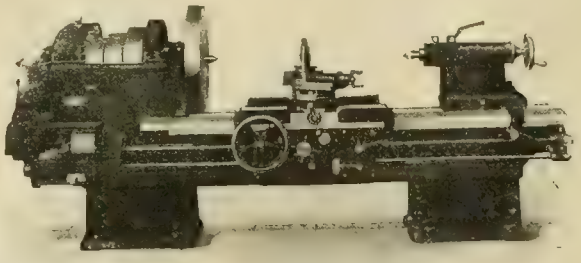

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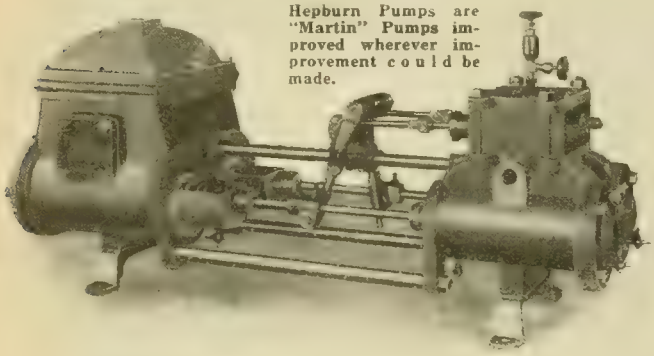

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The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company

ROCKFORD, ILLINOIS

Canadian Agents:

A. R Williams Machinery Co., Toronto

A DOLLAR

That's What We All Want, All Are Looking For

HOW? *WHEN?* *WHERE?*

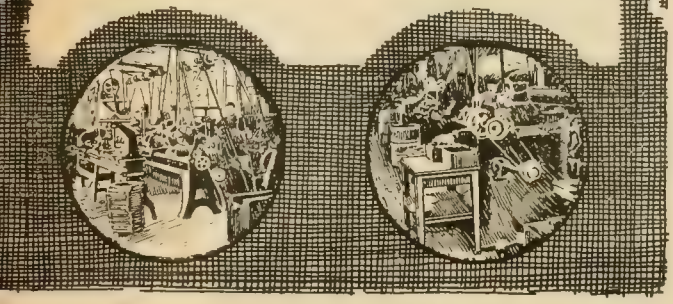
Buy a Cisco Lathe. Buy it now. See below where you will get a machine that in construction, in simplicity of operation, in accuracy, in efficient economy, and in lasting powers, will prove to you that the Lathe with the Pull—the Lathe of Simplified Accuracy has no equal.

Sold in Canada by
The A. R. Williams Mchy. Co. Ltd.
Home Office, Toronto

Made in Cincinnati by
The Cisco Machine Tool Co.
14" 16" 18" 24"

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems
Toronto Tool Company
516 Richmond St. West Phone Adel 1181



W. D. Anderson's Engineering Efficiency Service

Efficiency methods installed in industrial plants by **practical men** who thoroughly understand the subject.

GRAPHIC PRODUCTION CONTROL puts every man and machine on **schedule** and eliminates lost time entirely. It puts **vim** into the factory. It will completely revolutionize **your production problems.**

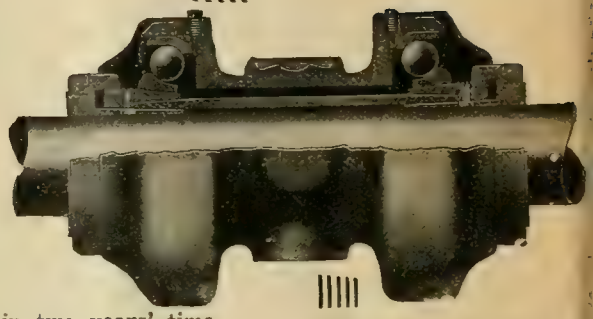
Our system is in practical operation in Glasgow shipbuilding plants, and New York, also in the Middle West, and London, Great Britain.

Sound, Practical, Absolute.

Let us write you about it.

Ring up Anderson's Efficiency Service
PHONE 221 ADELAIDE
380 Queen West Toronto, Canada

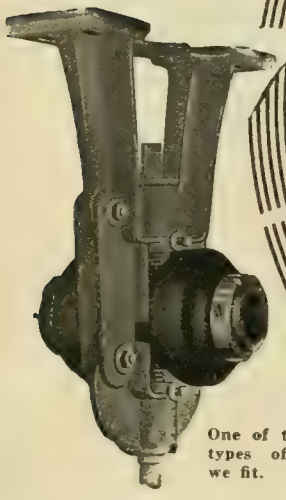
Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.
Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their economy.



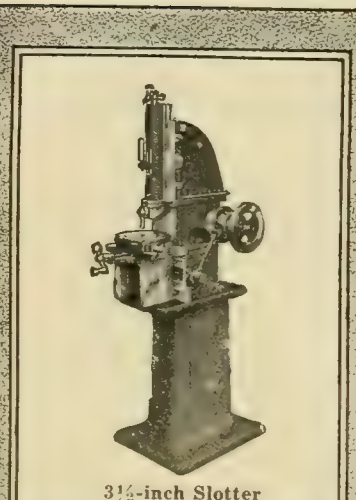
One of the many types of frames we fit.

Chapman Double Ball Bearing Company of Canada, Ltd.

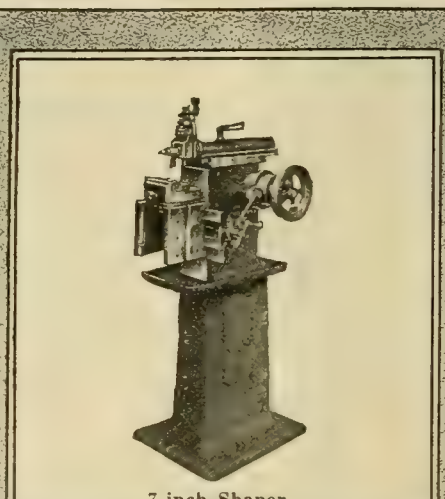
339-351 SORAUREN AVE., TORONTO

Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

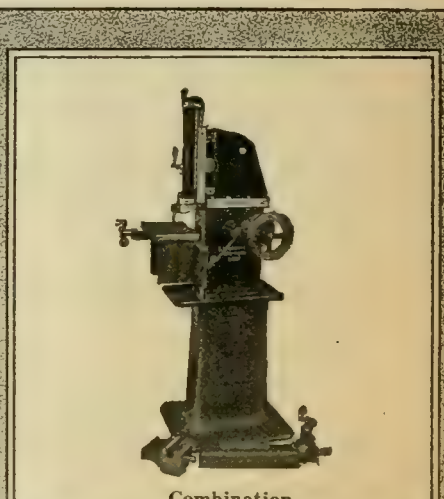
Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.



3½-inch Slotter



7-inch Shaper



Combination

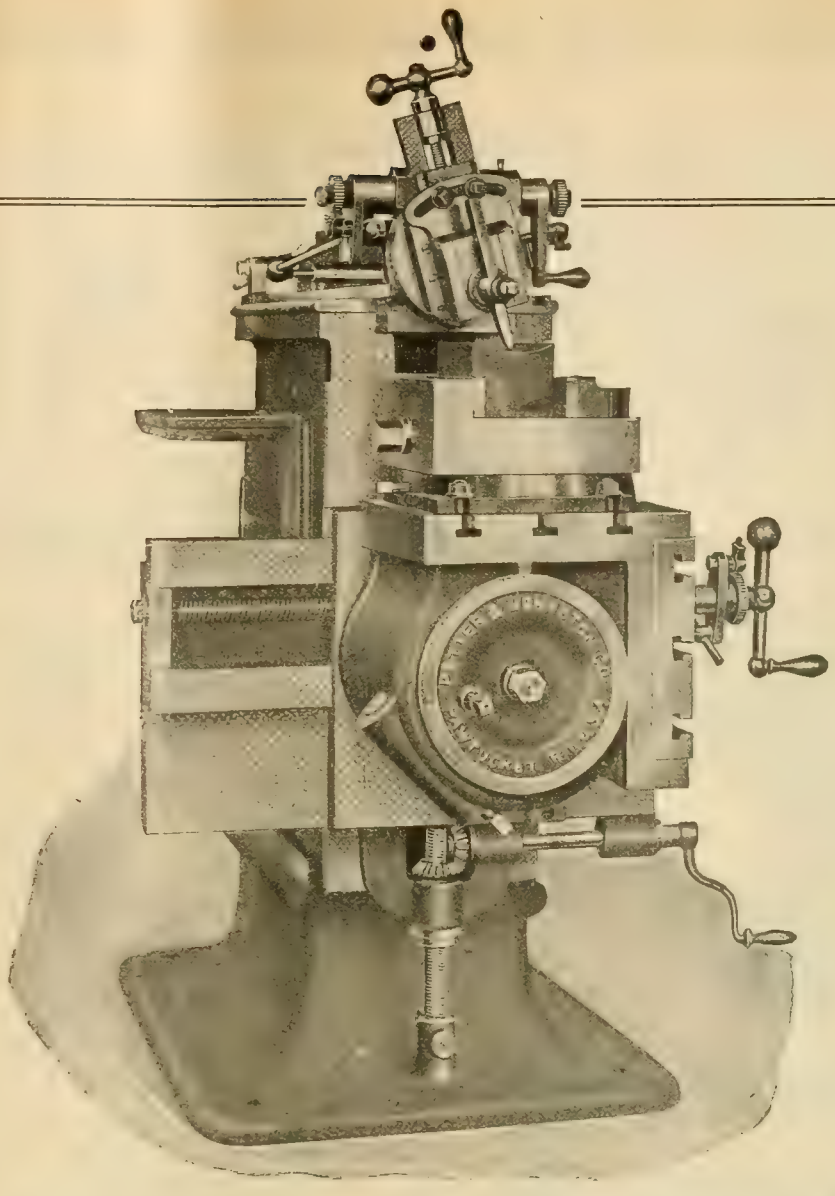
Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

The Rhodes Mfg. Company

Owned and Operated by the Jacobs Mfg. Co.

Hartford, Conn., U.S.A.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

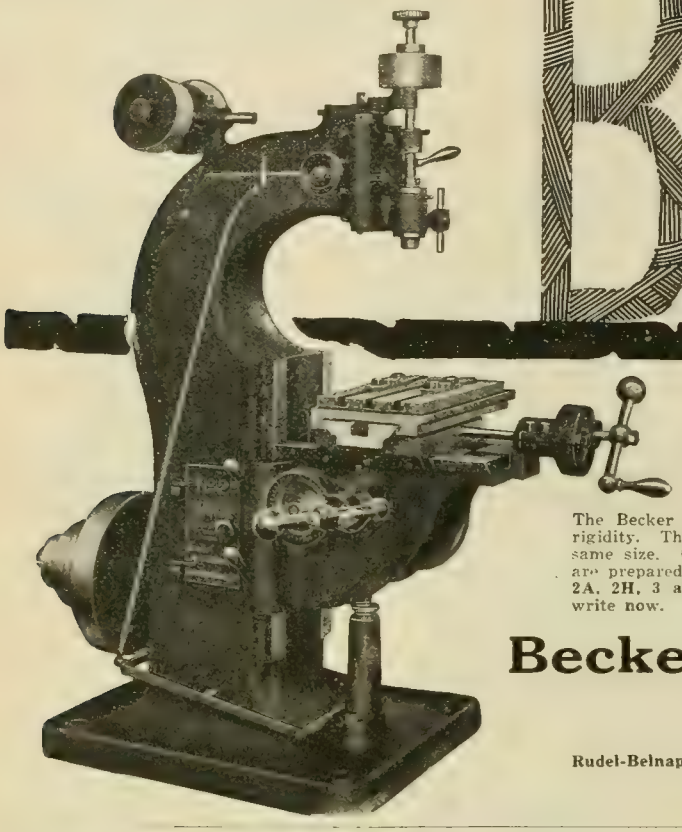
Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

Becker Belt-Driven Millers
—The Machines that Give the Smooth Finish

BECKER



Why You Should Select This Milling Machine

The Becker Miller has many exclusive features which give it matchless speed and rigidity. Then it requires one-third to one-half less power than other millers of the same size. QUICK DELIVERIES another feature of Becker Machines; in fact we are prepared to ship upon receipt of your order any of the following sizes: No. 1, 2, 2A, 2H, 3 and 4B. Any information you may require will be gladly furnished—write now.

Becker Milling Machine Co.
Hyde Park, Boston, Mass.

Canadian Agents:
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal; A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto.

Wire Cloth
of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

Drop a line for full details

Canada Wire & Iron Goods Company
Hamilton Ontario
Eastern Representative:
H. E. O. Bull, 184 Mance St., Montreal, Que

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

Don't Let Your Men Work with Dull Files

Tell them to turn them in when they have passed their "efficient point."

By doing so you will get more and better work from the men. You will save money because labor is more costly than material and your men will be better satisfied because no man likes to work with poor tools.

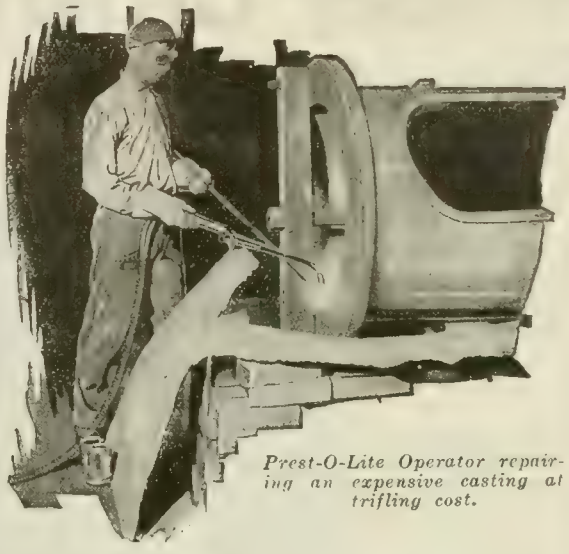
The files that give the longest efficiency are the "Famous Five."

Specify Them When Ordering.
They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

Oxy-Acetylene Welding and Cutting



Prest-O-Lite Operator repairing an expensive casting at trifling cost.

Prest-O-Lite Welding Saves Replacements

The Prest-O-Lite Process of Oxy-Acetylene welding is daily opening up new possibilities for economy and efficiency in the factories, mills, railroads, mines and machine shops of Canada.

For repair work, as well as for manufacturing, it is saving time and money in thousands of plants. Valuable time is saved through one Prest-O-Lite repair. Important machinery, machine parts and tools are saved from the scrap pile, and expensive replacements are frequently avoided.

Prest-O-Lite PROCESS

employs both Gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones; provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

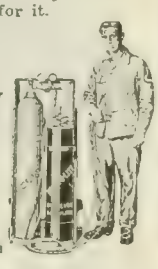
Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it.

Address Department C-107

Prest-O-Lite Company of Canada, Limited
PREST-O-LITE BUILDING
Corner Elm St. and Centre Ave.
TORONTO
Plants at: Toronto, Ont. Merritton, Ont.
Shawinigan Falls, P.Q. St. Boniface, Man.



World's Largest Makers of Dissolved Acetylene

If any advertisement interests you, tear it out now and place with letters to be answered.

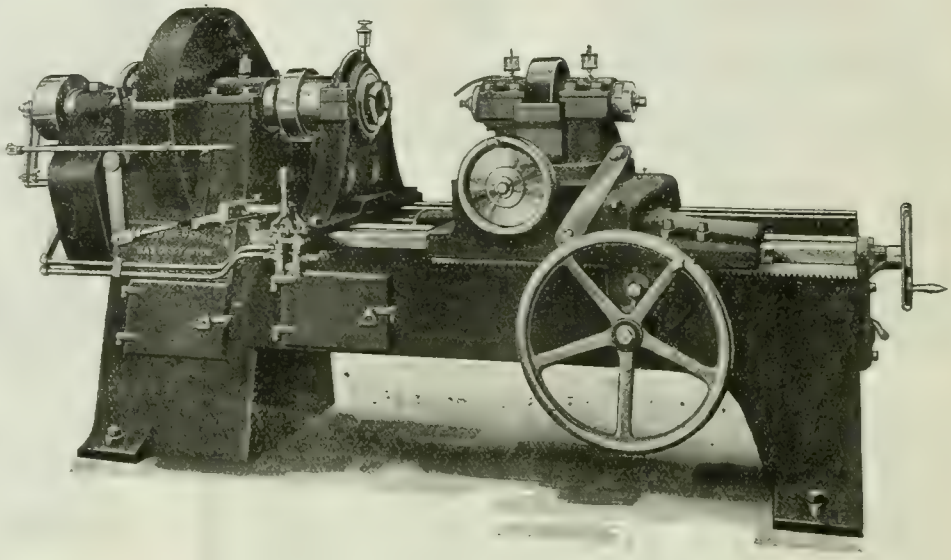
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

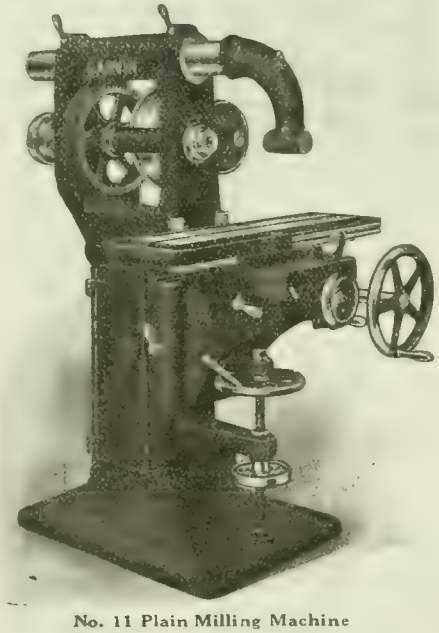


Write for Bulletin.

Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine
Use Code . . . . Abode

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers, sewing-machine manufacturers and others.

The Features of the Machine Are:

Telescope Arm.
Hardened and ground Tool-steel Bearing for arbor in arm.
Spindle Bearing Taper, with adjustment.
Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
Micrometer adjustments of Knee and Saddle.
Oil Pan around table.
Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

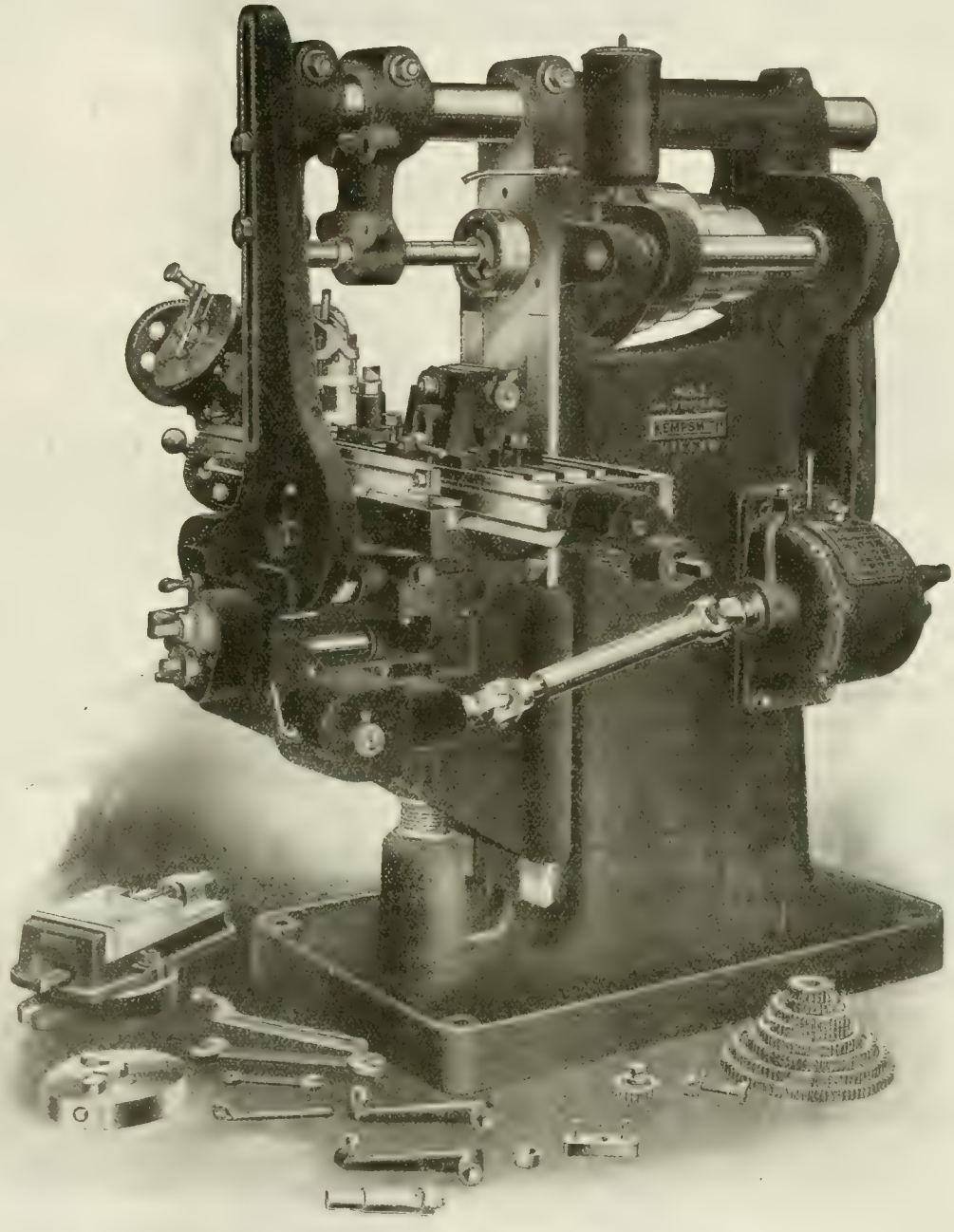
MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets *(Visitors Welcome)* **50 Years New York City**

KEMPSMITH

MILLING MACHINES



KEMPSMITH No. 2 Universal Milling Machine

Equipment—Double friction countershaft, 10½ inch Universal Dividing Head complete with tailstock, centering rest, Hill patent dog and driver, two index dials, set of change gears for spiral milling and index charts for operating; 6 inch Universal Chuck, 1 inch arbor, two arbor supports, brace, No. 3 Swivel Vise, outside tool shelf and all necessary crank handles, wrenches and accessories as shown.

THE KEMPSMITH MANUFACTURING CO.

MILWAUKEE, WIS., U. S. A.

HINTS TO BUYERS

CRANES
All Kinds
GEO. ANDERSON & CO. of CANADA, Ltd.
157 Craig St. W., MONTREAL, Que.

PRESSES and SHEARS
Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
BUFFALO, N.Y.

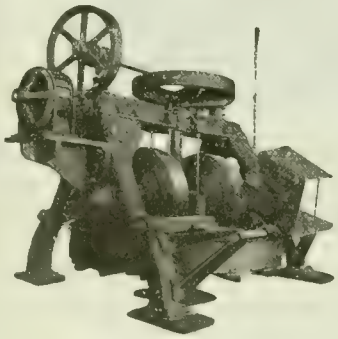
Socket Head Cap Screws
Clean cut socket holes, free from chips. Accurately threaded to standard gauges. Test them where great strength is desirable.
THE ALLEN MFG. COMPANY
HARTFORD, CONN., U.S.A.

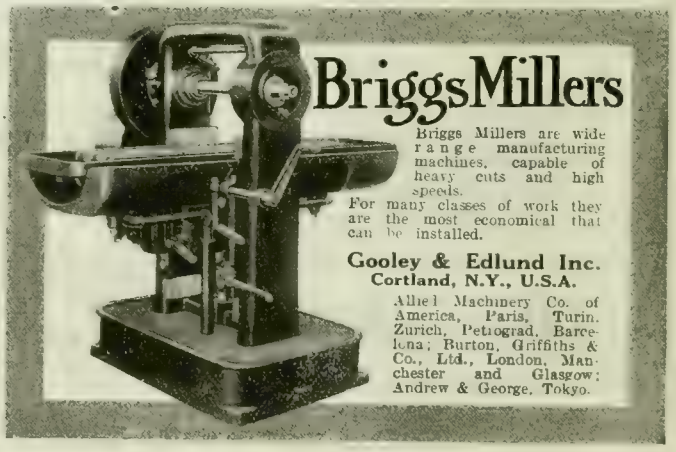
Eliminate Danger
Accidents break down the efficiency of your organization, lead to legal troubles loss of time and money.
TRADE MARK
BRISTO
REG. U. S. PAT. OFFICE
SAFETY SET SCREWS
insure safety. They also protect themselves because of their patented construction. The dove-tailed design of wrench and screw contracts the metal under pressure. The harder you twist the wrench the more the metal of the screw is compressed.
Write for BULLETIN 1-809
THE BRISTOL COMPANY
Waterbury, Conn., U.S.A.

THE WIRE IS PERFECTLY STRAIGHT
and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.
May we send you catalogue C?
The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Independent Skinner Chucks

FOR HIGH SPEED WORK
IRON OR STEEL BODY
The last word in chuck construction.
Wide jaws; hardened steel thrust bearings; adjusting screws of large diameter, threaded full length; jaws ground after hardening, etc.
Write us to-day for prices.
THE SKINNER CHUCK COMPANY, New Britain, Conn.
New York Office: 94 Reade St., N.Y.
Factory and Main Office: New Britain, Conn.
London Office: 149 Queen Victoria Street
San Francisco Office: Rialto Building

Canadian Steel Foundries Need Frost Improved Sand Mills

WINNING FEATURES:
Heavy Mullers
Unloading Device
Motor or Belt Drive
The Frost Mfg. Co.
112 W. Adams St., Chicago



Briggs Millers are wide range manufacturing machines, capable of heavy cuts and high speeds.
For many classes of work they are the most economical that can be installed.
Gooley & Edlund Inc.
Cortland, N.Y., U.S.A.
Allied Machinery Co. of America, Paris, Turin, Zurich, Petrograd, Barcelona; Burton, Griffiths & Co., Ltd., London, Manchester and Glasgow; Andrew & George, Tokyo.

DIAMOND POINTED TOOLS

Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service Goods submitted on memorandum to responsible firms.

Wheel Trueing Tool Company, 88 West Pitt Street, Windsor, Ontario

John W. Gordon, Manager, 5 James St., St. Catharines.

WE SELL METALS OF ALL KINDS

SCRAP
Copper, Brass
Lead, Babbit, Etc.
INGOT
Copper, Lead
Spelter, Etc.

STEEL
RAILROAD CAP AXLES.
BARS
BILLETS
ETC.

B. ENUSHEVSKY & SON, Toronto, Can.

DARLING BROTHERS, LIMITED

Engineers, Manufacturers and Founders
120 Prince Street, MONTREAL, P. Q.

Pumps for any Service—Steam Appliances Freight Elevators—Webster Vacuum Heating System.

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS
Won The
GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

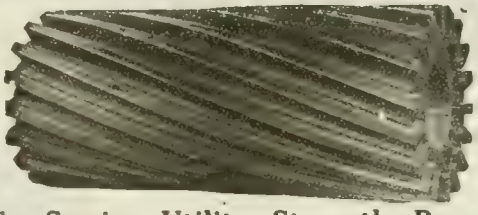
THEY ALWAYS MAKE GOOD

Write for Catalog.

Armstrong Bros. Tool Co.
"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A

Taylor-Newbold Milling Cutters

Fast Cutting
Power-ful



Inserted Helical Blades of High-Speed Steel

For Service—Utility—Strength—Power
4-in. Diameter for General Use.

May We Send Bulletin R-P?

THE TABOR MANUFACTURING COMPANY
PHILADELPHIA, PA., U.S.A.

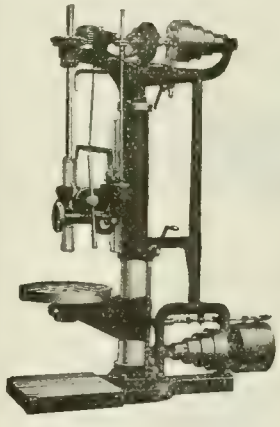
Greenfield

Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.
Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.



6 Positive Geared Feeds

instantly obtained, are but one of many advantages provided by

SILVER DRILLS

For 64 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

The Silver Manufacturing Co.
290 Broadway Salem, Ohio

CLUTCHES

Combined Jaw and Friction. Friction only.
Gas Engine Clutches. Jaw Clutches.
Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd., Canada
MONTREAL Factory: Aurora, Ont. TORONTO

GEAR

GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass.
G. B. GRANT U.S.A.

Northern Crane Works

LIMITED
WALKERVILLE
ONTARIO

Electric Cranes
Hand Cranes
Foundry Equipment

NORTHERN CRANES

CRANES
MADE IN CANADA

Electric Hoists
Air Hoists
Cupolas
Ladles

SMELTERS & WELDERS **GOGGLES**

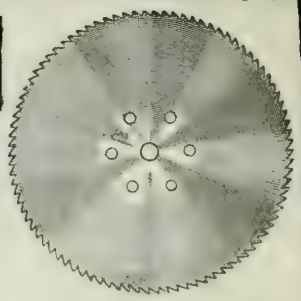
We have a style to meet every requirement

Write for Catalog

Consolidated Optical Company, Ltd.

Montreal Toronto Winnipeg Vancouve

HUNTER



Circular Metal Cutting Saw Blades

For Any Type of Machine

Unequalled for cutting Ingots, Bars, Forgings, Castings, Rails, Structural Shapes, etc. Sizes from 10" to 90" diameter.

Hot Saws, Friction Discs, Solid Blades made from Vanadium Tungsten and Chrome Alloy Steels. Saw Sharpening Machine-Inserted Tooth Grinders, Hardened Steel Specialties, etc. Write for prices.

Hunter Saw & Machine Co., Pittsburg, Pa.

J.C.McLAREN BELTING

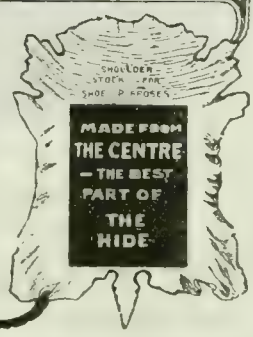
J.C. McLAREN BELTING OAK EXTRA TANNED EST 1856 CO.

Will Save You Money In Every Day of Service

Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

Ask for Quotations.

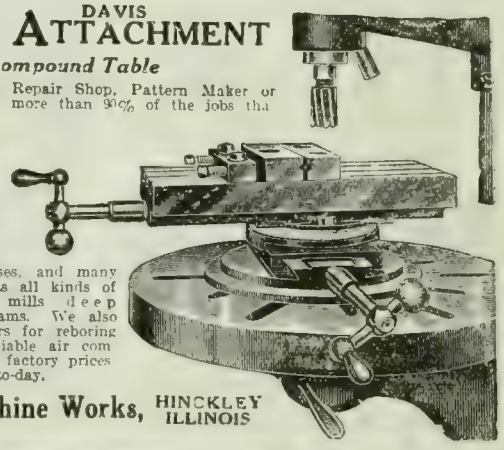
J. C. McLAREN BELTING CO.
Limited
Montreal Toronto Winnipeg



THE MILLING DAVIS ATTACHMENT

and Compound Table

For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



For any Drill Press 14" to 42" swing. Big Economy — Big Convenience— Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices Write for circulars to-day.

Hinckley Machine Works, HINCKLEY ILLINOIS

NEW AIR-TIGHT BLAST GATE
FOR LOW AND MODERATE PRESSURES

(Patented)

"The Air-Tight Blast Gates in use in our plant have given entire satisfaction."
CANADIAN PACIFIC RAILWAY COMPANY, Montreal, Canada.

Our NEW AIR TIGHT BLAST GATE will save the air **(money)** you are now losing through leaky blast gates.

Circular 123-T explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks. Ask for circular and list of users

W. S. ROCKWELL COMPANY
Furnace Engineers and Contractors
50 Church Street, New York (Hudson Terminal Bldg.)
Canadian Distributors: Drummond, McCall & Co., Ltd., Montreal

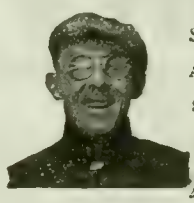
OAKITE CLEANS

Our business is to solve your cleaning problems Put it up to us!

OAKLEY CHEMICAL CO
44 THAMES STREET NEW YORK

LINSEED OIL SOAPS

ELM OIL COMPANY
TORONTO, ONT.



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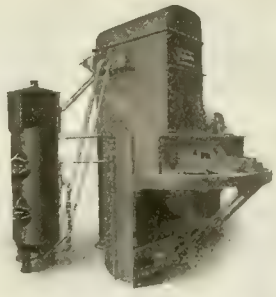

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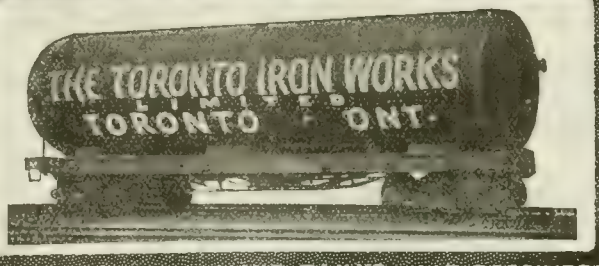

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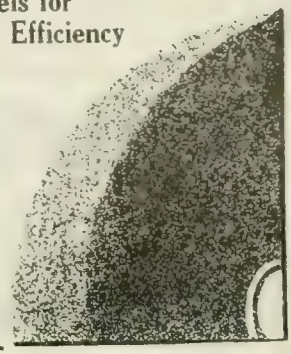

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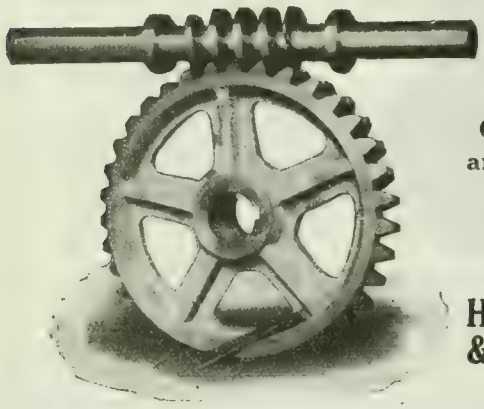

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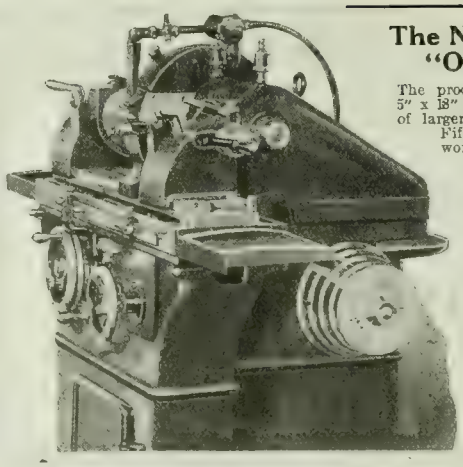

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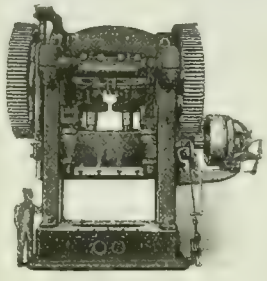

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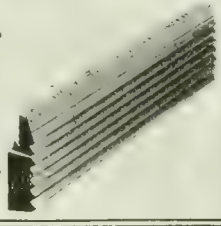

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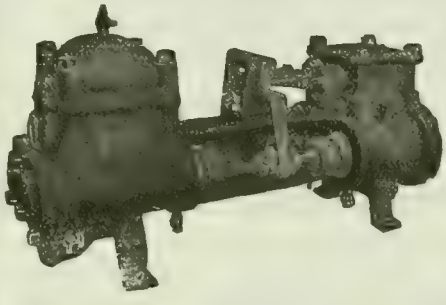

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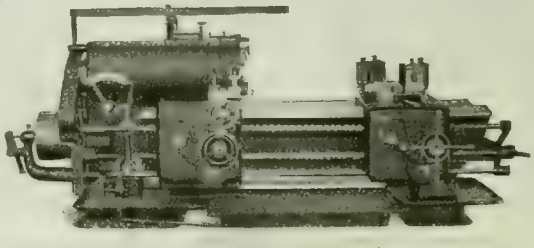

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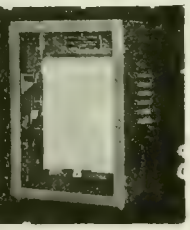

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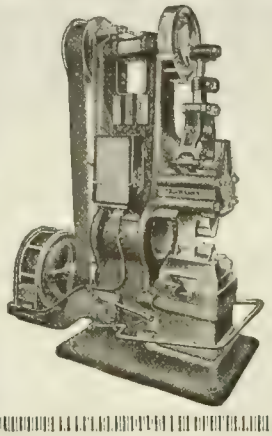

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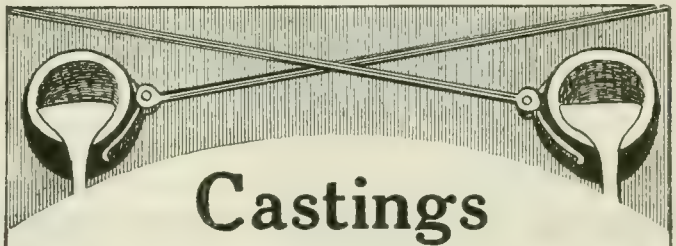

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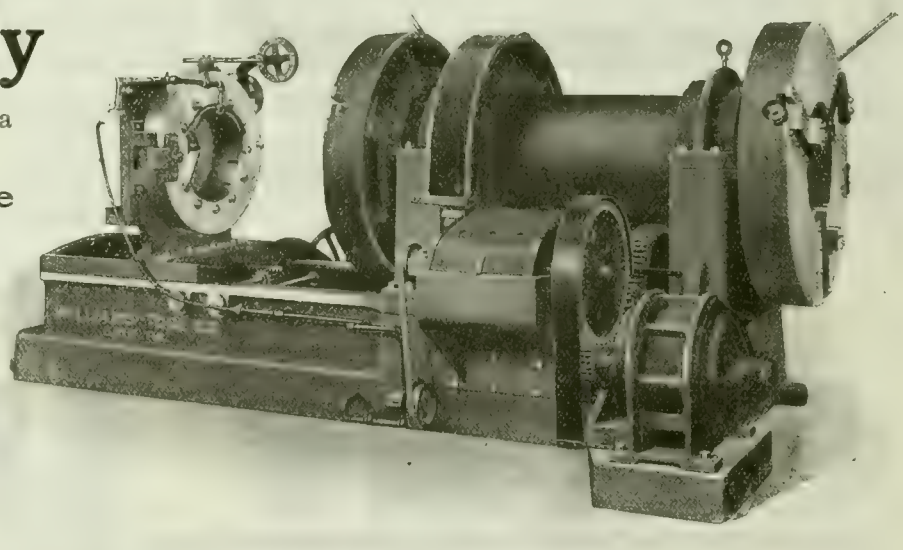

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Giddings & Lewis Mfg. Co., Fond du Lac Wis
Gisholt Machine Co., Madison, Wis.
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Niles-Bement-Pond Co., New York.
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Tallman Brass and Metal Co., Hamilton, Ont.
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United Brass & Lead Ltd., Toronto.
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CASTINGS, MALLEABLE
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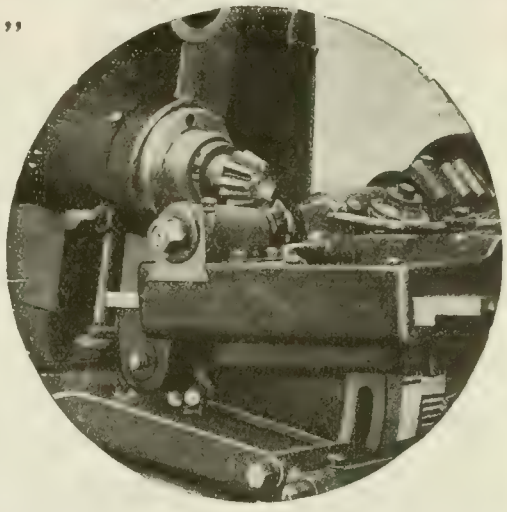
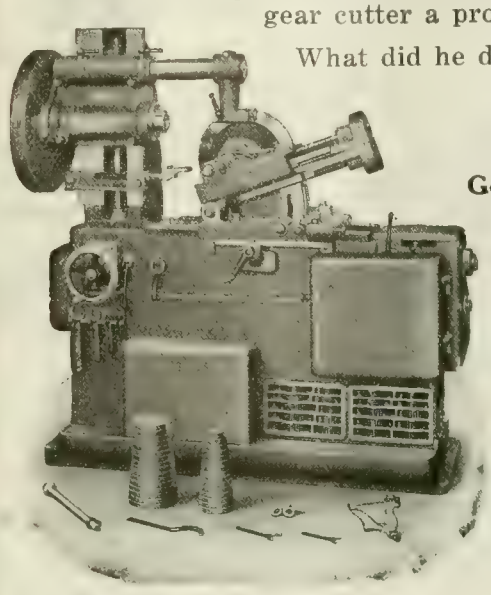


He didn't use enough spur gears to warrant putting in a spur gear cutting machine. Neither did he use enough bevel gears to make the installation of a bevel gear cutter a profitable investment.

What did he do?



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One 25″ x 50″ Left-Hand Wheelock Engine.
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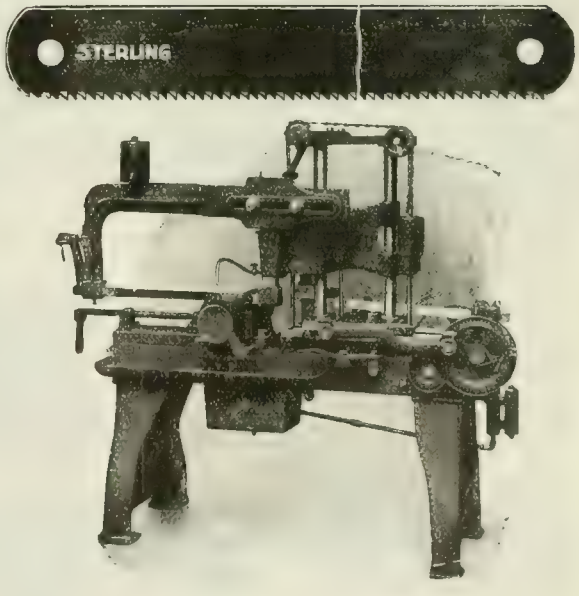

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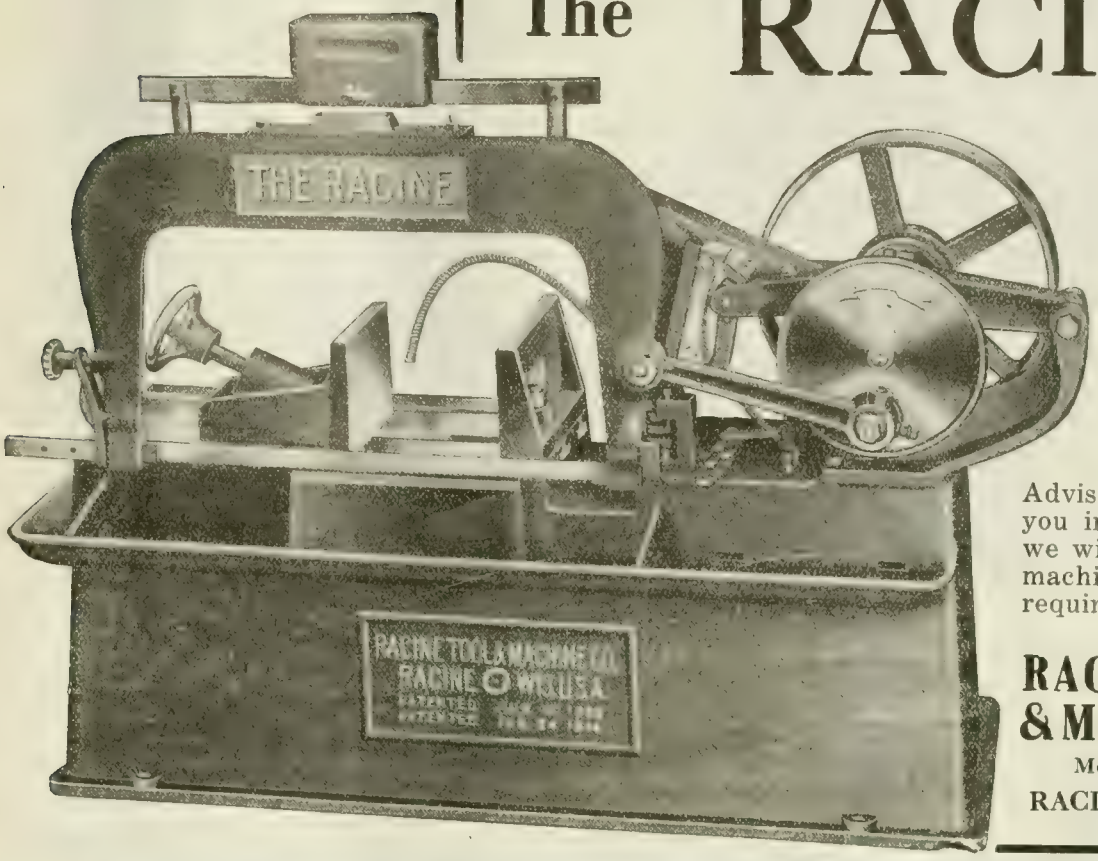

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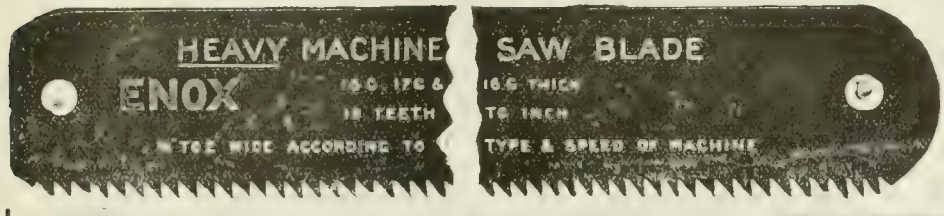

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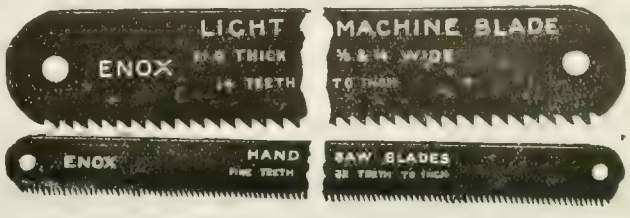

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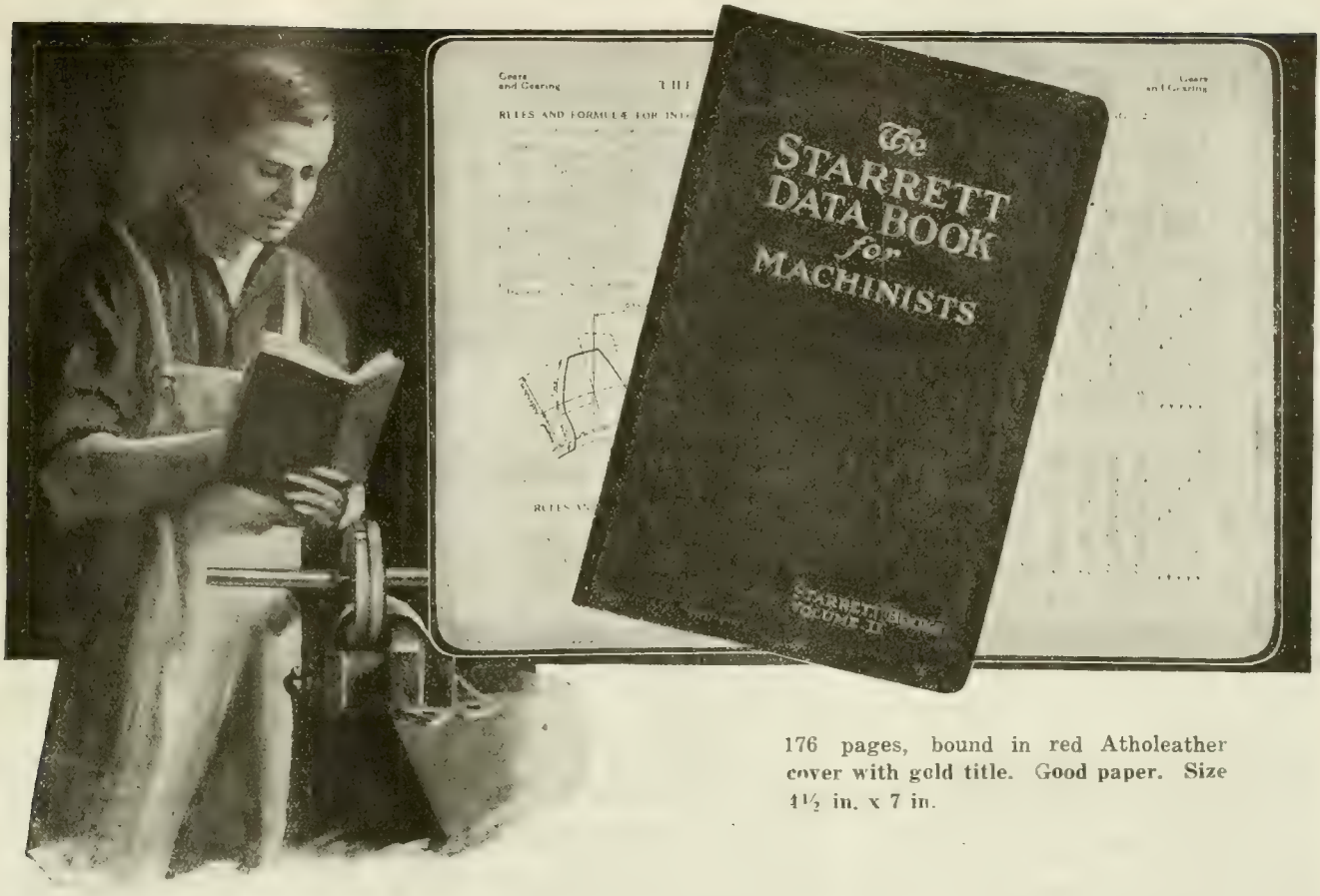

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Grand Rapids Grinding Mach. Co., Grand Rapids Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O
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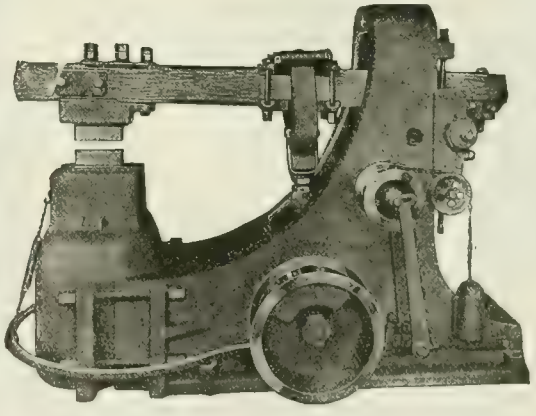

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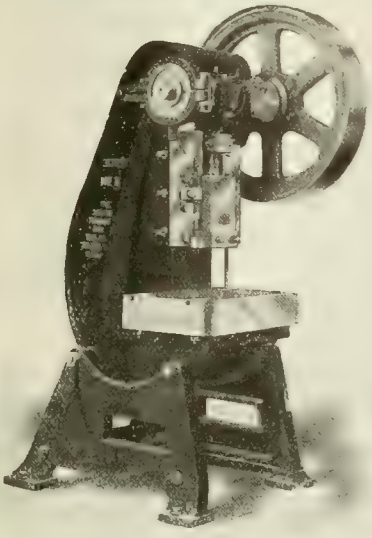

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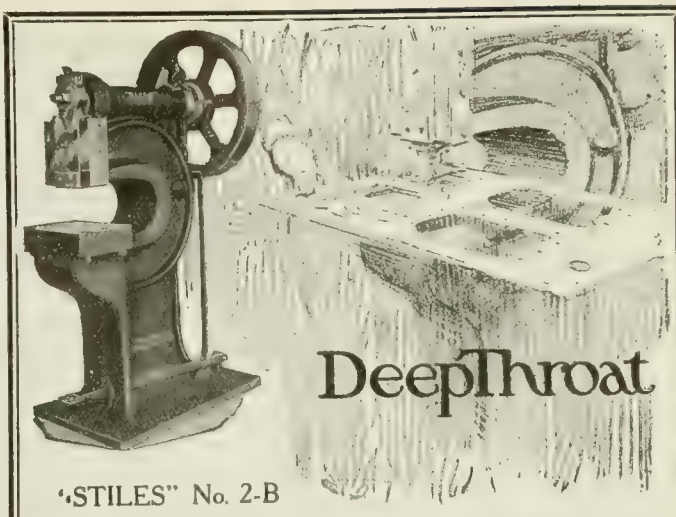

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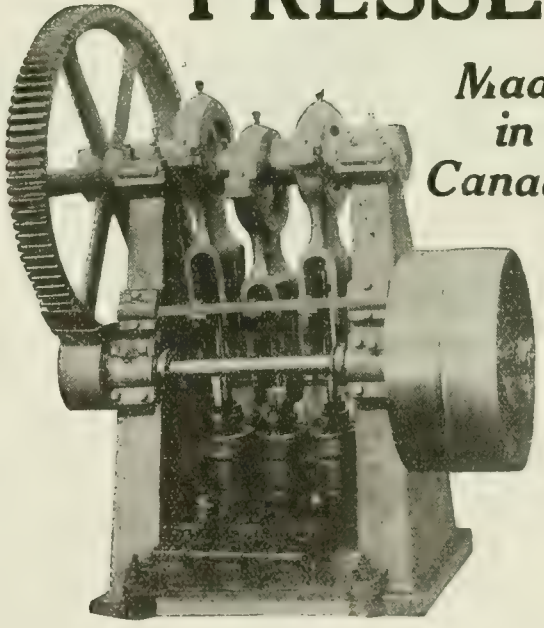

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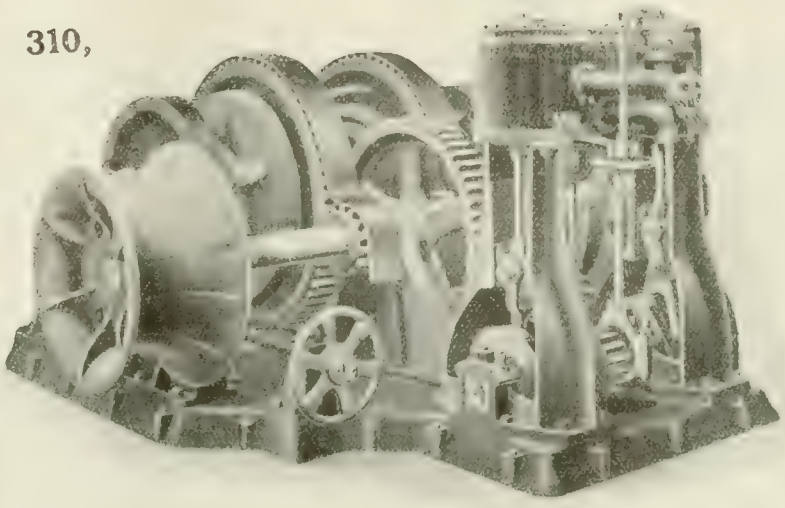

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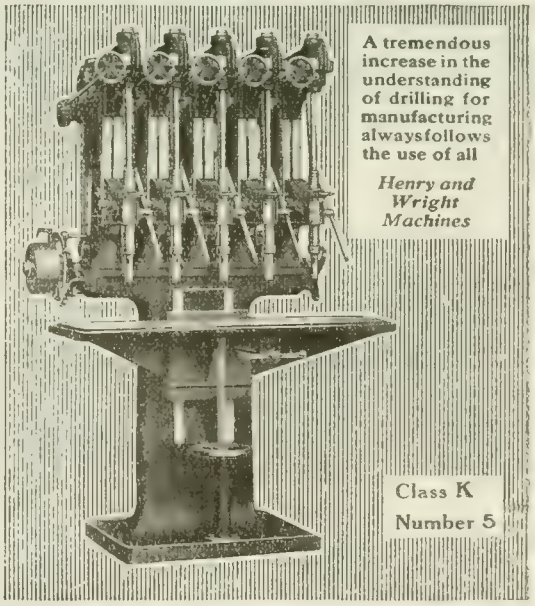

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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.
The Farmer in Politics, by J. K. Munro.
The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.
Old Times in Canada, by Walt Mason.
Lend Me Your Title, by Onoto Watanna.
The Three Sapphires, by W. A. Fraser.
Wild Miners I Have Met, by E. Ward Smith.
The Anglicization of Katrina, by Mary Josephine Benson.
Saturday's Child, by Mary E. Lowrey.
The Minx Goes to the Front, by C. N. and A. M. Williamson.
The Veins of the War God, by Corporal Herbert Forder.

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SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

STAMPING
Canadian Cartridge Co., Ltd., Hamilton, Ont

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont

SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y.

SHIPBUILDING
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario
New Britain Mach. Co., New Britain, Conn

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford Mass.
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Ferracute Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Eglund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co. Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Can., Galt, Ont.

STAIRS, IRON
Can Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y

STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que
Boker & Co., Inc., H., Montreal, Que
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa

STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.

STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain Conn

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn
Bertrams, Ltd., Edinburgh, Scotland

STRAND
Page Steel & Wire Co., Adrian, Mich

SUPPLIES, CONTRACTORS'
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto

TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.

TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que
Toronto Iron Works, Ltd., Toronto.

TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn
Williams & Wilson, Limited, Montreal, Que

TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

TAPS, ADJUSTABLE
Baxter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que
Butterfield & Co., Rock Island, Que
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Can., Galt, Ont.

TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Can., Galt, Ont.

TAPS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Can., Galt, Ont.

TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

TAP EXTENSIONS
Allen Mfg. Co., Hartford, Conn

TAP EXTRACTORS
Walton Co., The, Hartford, Conn

THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A
Taylor Instrument Co., Rochester, N.Y

TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto

THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont
Williams & Wilson, Limited, Montreal, Que.

THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

THUMB SCREWS AND NUTS
Canada Found'n & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto
Williams & Co., J. H., Brooklyn, N.Y.

TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can
Williams & Wilson, Limited, Montreal, Que

TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont

TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Rice, Lewis & Son, Toronto, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal.
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Deloro Smelting & Refining Co., Toronto, Ont
General Steel Co., Milwaukee, Wis.
G. A. Drury Co., Montreal
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass
Hawkridge Bros. Co., Boston, Mass
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill
A. R. Williams Machinery Co., Toronto
Ford-Smith Machine Co., Hamilton, Ont
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis, Mo
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

TRANSMISSION POLES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

TRANSMISSION ROPE
Jones & Glassco, Montreal, Que
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo
Dominion Bridge Co., Montreal, Quebec.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que
Williams & Wilson, Limited, Montreal, Que

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Limited, Montreal, Que.

VISE STANDS, PORTABLE
New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass
The Geo. F. Foss Mchy. & Supply Co., Montreal
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y
Williams & Wilson, Limited, Montreal, Que

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn
Williams & Wilson, Limited, Montreal, Que

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass
London Bolt & Hinge Works, London, Ont
Steel Co. of Canada, Ltd., Hamilton, Ont.

WASTE
United Brass & Lead Ltd., Toronto.
Wilkinson & Komnass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WELDING, ELECTRIC, SPOT, BUTT, ETC.
St. Lawrence Welding Co., Montreal, Que.

WELDING MASKS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

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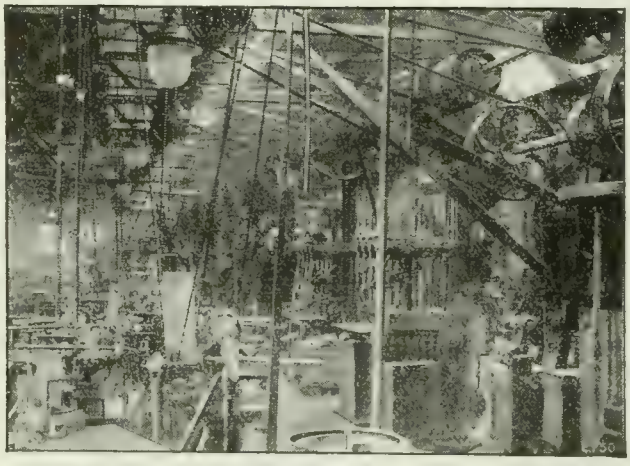
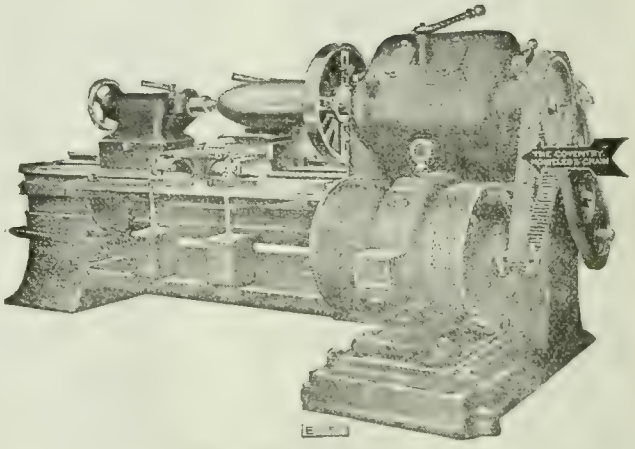


THE OLD WAY

Notice the space occupied by belts, pulleys and shafting, which darken the workshop and throw shadows on the work.



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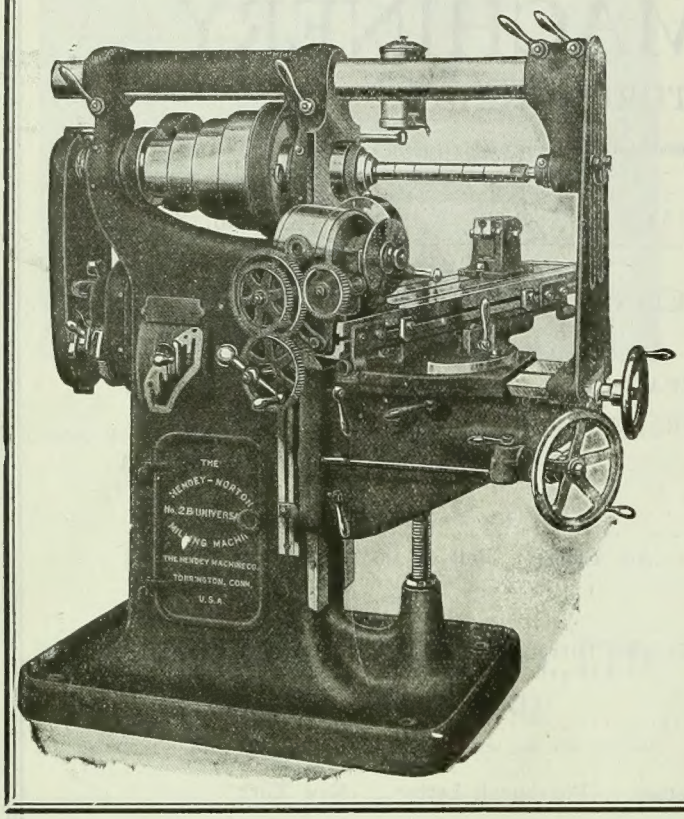

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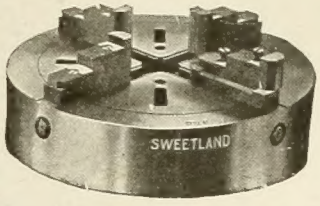

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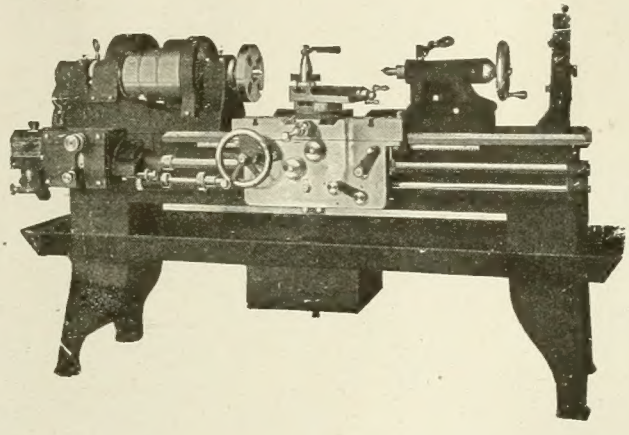

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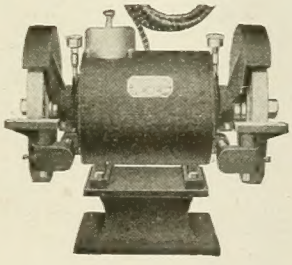

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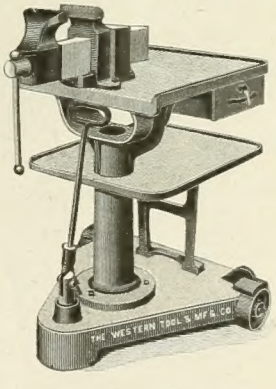

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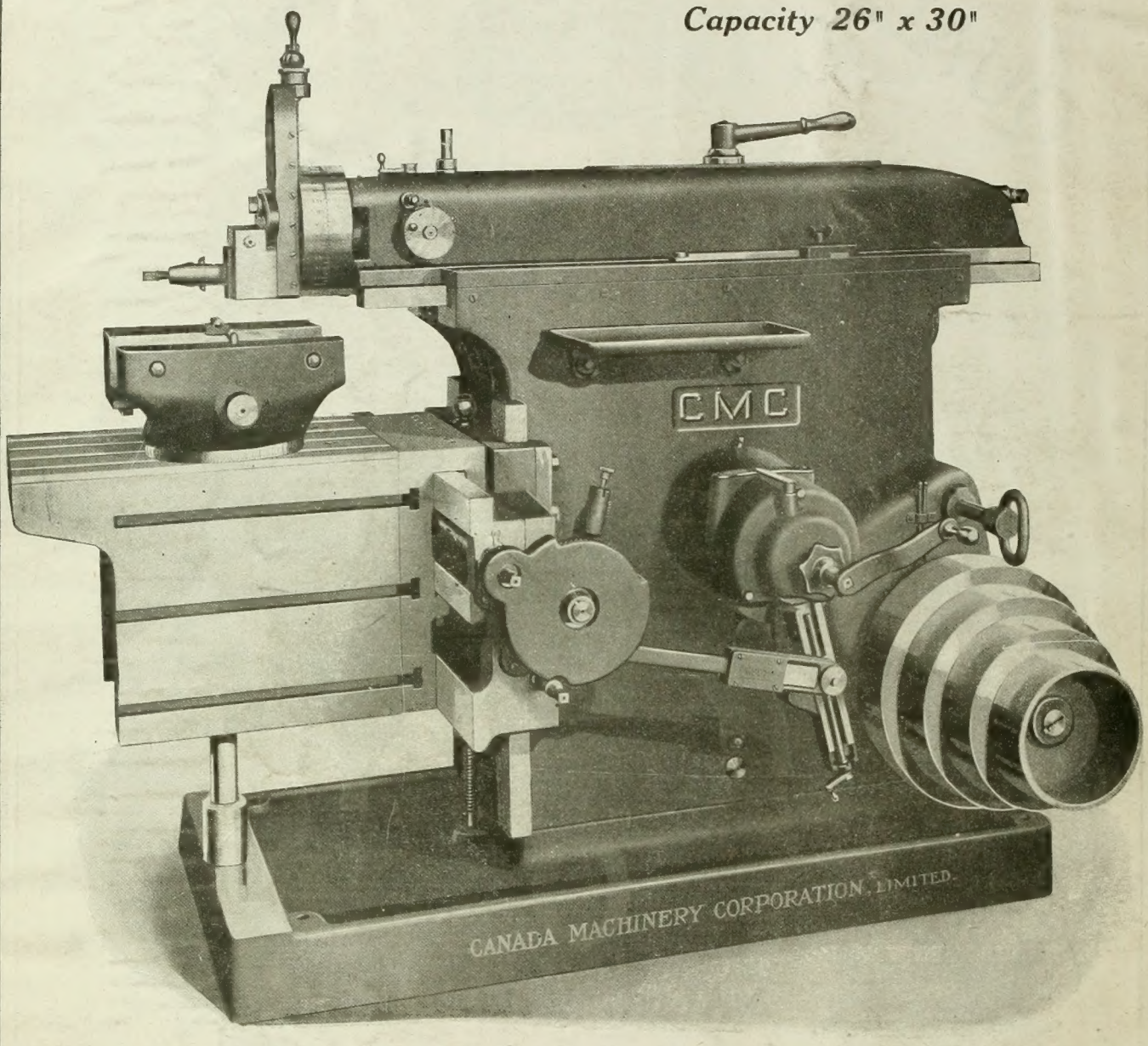

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